

Wounds

عام جداً نظري

Definition:

It is forcible loss of continuity of soft tissues by mechanical trauma.

Classification:

1- **Open wounds:** associated with loss of the continuity of the skin.

2- **Closed wounds:** associated with intact skin. *most common is Contusion & hematoma.*

1- **Open wounds:** Are either **incised, stab, lacerated or gunshot.**

a) **Abrasion:** Partial denusion of superficial layers of skin due to friction of skin with a rough surface.

b) **Incised wounds:** due to sharp objects are liable for more bleeding & less liable for infection. *أشهر جراح العظام*

c) **Stab or punctured wounds:** is caused by pointed objects as nails and daggers. *characterized by small external wounds with liability of deep injuries.*

d) **Lacerated wounds:**

- They are caused by blunt heavy objects.
- These wounds are **less liable for profuse bleeding** (as the blood vessels are crushed).
- **More liable for infection** whether nonspecific or specific as tetanus & gas gangrene. *as there are free crevices tissues in wound.*

e) **Missile wounds:**

- They have an inlet (for entry of the bullet) and may have an exit.
- The damage is due to the following factors:
 - Direct damage by missile track.
 - Shock waves preceding missile injury to the body.
 - Temporary cavitation effect.
 - If bone affection; bone fragments act as secondary missiles.
- The degree of injury by the missile depends on its size and velocity:
 - **Low velocity missile** e.g. bullet from a pistol produces injury due to its direct effect by laceration and crushing within the passage of the missile.
 - **High velocity missile:** Tissue necrosis occurs several centimeters on either side of the track due to the cavitation effect. It is more lethal.

f) **Bites:** either human or animal bites. They are very liable to infection. *Number of Germs in human mouth is more than ones!!!*

2- **Closed wounds:**

a) **Contusion = Ecchymosis:** It is extravasation of blood from injured small blood vessels with no formation of a swelling.

b) **Hematoma:** Localized collection of blood in the loose tissue spaces.

Management of open wounds

1- **First aid treatment:**

- Control bleeding by compression.
- Protect the wound from contamination.
- Analgesics for pain.
- Splintage of fracture if the wound is associated with it i.e. compound fracture.

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TTT:

1- Clean cut wound.

2- Lacerated in 1st 6 hours & clean:

لدرز تقص ال edges لانها crushed عشان فيها necrotic tissue
وانت من شايه عشان ميحطش 2ry int.
وبناجل name & tendon.

3- after 6 hours:

دا هالدم exp. بقالا مرة كل فصل inf. or not ?
خنازون لو شكيت متعطلش لانك لو قفلت وطلع كاه في inf.
يبقى انت كذا علة injury مجر.

فالبيان دا لو خا لك يبقى قد اى dead tissue وبيع 6-7 ايام
محو الجرح وبيد كذا اقل عشان ت
heal by tertiary int.

4- Infected wounds (whether cut or lacerated but usually lacerated)



بتتصف الجرح و نسب edges عشان متفتحش
طبعه على ال infected tissue وال immunity لمتح
من الجرح ال infected.

وتعتقد بعد كذا زغيره على الجرح غايه اما ينصف

5- Missile wounds:

متخذش جرح كبير، افترخ infection و متفتحش
nerve & tendon.
و برضو متقلش عضه مكسر، لان العضه دا محتاجه

II- Definitive treatment:

Do 3 anti: (anti-shock, anti-biotics and anti-tetanic serum).

1- Clean cut (incised wounds) within the first 6 hours:

- No contamination and no risk of infection.
- The edges of wound are approximated by suture.
- Tendons and nerves can be sutured. This aims at healing by primary intention

الوحيد الى علاج
في tendon

2- Lacerated wound within the first 6 hours: not infected.

- The edges of the wound are excised and primary suture of the wound is done.
- Tendons and nerve repair is postponed 4 – 6 weeks.

3- Wounds seen within 24 hours and are potentially contaminated:

- The dead muscles and dead tissues are excised, foreign bodies are removed.
- The wound is left opened for dressing with no suture for 4-6 days.
- When healthy granulation fills the wound delayed Primary suture can be done.

4- Infected wounds:

- Debridement is done in which only dead and devitalized tissues are removed.
- No excision of the edges of the wound is done, as this will break the body defense against infection. Daily dressing is done.
- When the wound gets cleaner it can be closed by suture or by skin grafting.

5- Missile injuries:

- Incise the skin generously but do not excise much skin from the wound margin.
- Incise the deep fascia widely and identify the neurovascular bundles.
- Excise dead muscles and foreign bodies but do not remove comminuted bone. Cut tendons and nerves are not sutured.
- Leave the wound open to allow free drainage.

6- Amputation:

- Indicated in severely lacerated wounds with comminution of bones and injury to the blood supply and nerves of the limb that cannot be repaired.

2 weeks
Skin & muscles → lacerated.
Arty & vein → injured.
nerve → damaged.

عنان في 5 حافة

N.B.:

- 1- If there is any doubt about the advisability of suturing the wound, do not suture. Primary suture of a contaminated lacerated wound can lead to more damage than the original injury.
- 2- If there is an associated fracture and there is any possibility of infection, it is advisable to stabilize the fracture by some form of external fixation, because internal fixation is contraindicated in these circumstances.

Crush syndrome:

limb crushed $\rightarrow$ but A.V. are patent, but muscle is crushed & these muscles are ischaemic but rest of limb is normal.

Crushed tissues $\rightarrow$ release Myoglobin which may cause Renal Failure.

Complications of wounds

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General complications

1- Shock: Neurogenic, hypovolemic or septic shock.

2- Crush syndrome:

Etiology:

- Prolonged ischemia with irreversible muscle necrosis.
- Toxic substances from damaged muscles leak out into circulation & are excreted in urine.
- Acid myohematin precipitates in the tubules producing anuria & irreversible renal failure.

Treatment:

- Prevention of renal failure by alkalinization of urine, blood transfusion, IV fluids & mannitol. (to produce diuresis).

- Care of the injured limb:

- Should be immobilized & kept cool. to decrease blood which goes to limb
- Care of the wounds.

Local complications

- Injury to important structures.
- Infection.
- Retained foreign bodies.
- Complications of healing

Wound healing & management

Wound healing

X Components of wound healing:

- Wound contraction**: helps to diminish the size of wound.
- Granulation tissue** formation which is replaced later by **fibrous tissue**.
- Epithelialization**.

Stages of wound healing

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1- Hemostasis & inflammation phase:

- Injury of blood vessels leads to aggregation of platelets & activation of coagulation.
- This is followed by chemotaxis of leucocytes, macrophages & lymphocytes.
- Macrophages play an important role in phagocytosis & wound debridement.
- This phase lasts for about 5 days, but it may be prolonged if there is wound infection.

2- Proliferation phase: *formation of collagen fibers*

- This phase is characterized by the proliferation of **fibroblasts** that secrete collagen fibers.
- **Endothelial cells** with **fibroblasts** form the granulation tissue.
- **Epithelial cells** proliferation.

3- Maturation & remodeling phase:

- **Deposition of the collagen** fibers become **thicker** and they get arranged **along the lines of stress** leading to increase in the tensile strength of the wound.
- The process of remodeling continues **for about one year**.

maturation phase ends by epithelialization. *remodeling phase*

X

In addition to the above mechanisms, wound contraction helps to diminish the size of wound

Types of wound healing: شام شفی

Healing by primary intention: This occurs in clean wounds when they are immediately closed by sutures or clips. Healing occurs with minimal scarring leading to a nice scar.

Healing by secondary intention: This occurs when the wound edges are not approximated or when gaping occurs as a result of a hematoma or wound infection. Healing occurs by infilling with granulation tissue and so there is more fibrous tissue. The resulting scar is ugly.

Healing by tertiary intention: potentially contaminated wounds are left open for about 5 days. At the end of this period if there are no signs of infection; **delayed primary sutures** can be performed.

Factors affecting wound healing

General factors

- 1) Age: Wound healing is slow in elderly persons due to a reduced rate of protein turnover.
- 2) Nutritional state:
 - a. Protein deficiency leads to diminished synthesis of collagen.
 - b. Vitamin C deficiency is responsible for lack of maturation of collagen.
 - c. Vitamin A deficiency leads to deficient epithelization.
 - d. Calcium, zinc, copper & manganese also affect wound healing.
- 3) Debilitating diseases: Uremia, jaundice, cirrhosis, diabetes & malignancy delay wound healing.
- 4) Drugs: Steroids and cancer chemotherapy impair wound healing.

Local factors

- 1- Vascularity: A good blood supply (e.g. in the face & scalp) leads to nice healing while a poor blood supply (wounds below the knee) causes delayed healing.
- 2- Immobilization: Movement delays healing.
- 3- Local irradiation: Inhibits wound contraction & granulation tissue formation.
- 4- Tension: Any increased tension in the wound will lead to ischemia & impaired healing.
- 5- Infection: Fibroblasts compete with bacteria for oxygen & nutrition. Moreover, bacteria secrete collagenolytic enzymes, which destroy collagen fibers.
- 6- Foreign bodies & necrotic tissue: impair wound healing.
- 7- Adhesion of wound to a bony surface: Prevents wound contraction, e.g. chronic venous ulcers.
- 8- Impaired venous drainage: as in postphlebotic limbs impairs wound healing.

Complications of healing:

- 1- Wound failure (wound dehiscence): General or local factors which affect wound healing can lead to wound failure. Failure of an abdominal wound is called burst abdomen.
- 2- Stretching of the scar.

	3- Hypertrophic scar	4- Keloid
Definition	Delayed maturation of collagen fibers in a wound.	Failure of maturation of collagen fibers in a wound
Induration	Limited to the scar	Extends beyond the scar
Course	Stationary after 6 months	Progressive even after 6 months
Sites	Common in shoulder & presternal area	Ear lobules, shoulder, presternal area

Incidence of Keloid:

Black persons are more prone to keloid formation and there is a familial predisposition

Treatment of hypertrophic scars and keloids:

- Continuous pressure by silicone gel sheets.
- Intralesional corticosteroids
- Surgical excision: Recurrence rate after simple excision may reach 80%. To minimize recurrence intramarginal excision of the scar is recommended together with intraoperative injection of steroids.

5) Contracture: resulting in deformities

6) Wound infection.

Accident & Emergency Surgery

هام جداً نظري

Introduction: of any Q trauma.

- Trauma is now a leading cause of mortality and morbidity, especially in urban areas.
- Unfortunately, most of the victims of trauma are young persons.
- With proper treatment many injured patients can be saved.

Mechanism of injury:**1- Penetrating injuries:**

- Low velocity injuries caused by knife & other sharp objects.
- High velocity injuries caused by firearms.

2- **Blunt injuries:** e.g. road traffic accidents, fall from a height or direct blows.

Causes of trauma mortality:

Immediate deaths: occur within few minutes due to major trauma or injuries to the heart, rupture of a major vessel or a major airway. ex: Cardiac.

Early deaths: occur within hours after accident & can be prevented by rapid, proper management & it include intracranial hemorrhage, massive intra-abdominal or intra-thoracic injuries or major fractures. ex: rupture spleen.

Late deaths: occur some weeks after the injury usually due to sepsis or multiple organ failure.

لوانت ماش من الشارح ولقت واحد مضبوط نظام

- * طلع من الحبيب البين ^{المرطوب} - ^{airway} check
- * لو شكك من ^{airway} check - طلع من جيبك الشمال plastic collar.

دا اللي مكتوب من كتاب القسم!!!

الأمريكان خطوا نظام للعامل عشان تبص على أخطايات

1- Airway:

2- Breathing: Tension pneumothorax. —
So examine chest rapidly.

3- Circulation: shock
you manage as shock.

4- Disability: Complete neurological stimulation

5- Exposure: بنقش لدور من بنقله
ونخطه من warm blanket.

بيتر دوتش بيا خذ نصه، صفة من، اظمت على جراحات

ابدأ بتس Dry Survey.

Organized trauma care

- Check that the airway is patent: Support the mandible forwards; suck any secretions in the mouth. If necessary insert an oropharyngeal airway.
- During transfer of the patient, care should be taken to avoid flexion of the spine that may lead to dislocation in unstable spine injuries. If a cervical spine injury is suspected, a rigid cervical collar is applied.

- Victims of major trauma are best treated by a well-organized and trained **trauma team**.
- Accident and emergency departments should have an equipped **resuscitation area** to receive major trauma victims.
- In mass casualty accidents, the concept of **triage** is important. Triage means sorting of patients, i.e., their ranking according to both their clinical need and the available resources to provide treatment. من العصر العيسن يدخلوا كل الحالات لذن بيخافوا
مروح يعمل فضيحة من أخبار اليوم .
- The American College of Surgeons developed the **Advanced Trauma Life Support (ATLS)** accepted protocol for the management of major trauma victims. ATLS protocol has three elements
 1. Primary survey / resuscitation.
 2. Secondary survey.
 3. Definitive care of individual injuries.

Primary survey/ resuscitation:

Objective: to identify & treat any immediately life threatening conditions.

Steps:

- A – Airway (& cervical spine control).*
- B – Breathing.*
- C – Circulation with hemorrhage control.*
- D – Disability (neurological assessment).*
- E – Exposure & Environment.*

Airway:

Clear airway:

- 1- Vomitus, blood or foreign material should be removed.
- 2- This is followed by chin lift or jaw thrust.

Airway & cervical spine control:

- 1- Suck any secretions or blood in the mouth or remove by finger.
- 2- Chin lift.
- 3- Insert an oropharyngeal airway.
- 4- If the patient is deeply comatose insert a cuffed endotracheal tube.

N.B.) Tracheal intubation is especially indicated in closed head injuries (allow hyperventilation to decrease intracranial pressure)

• Secondary Survey

امحل كل المشاكل الآن عندنا واحد خطا للعلاج .

• Definitive

عزير جدا [Surgery] عشان ميخونكش [injury or wound]

ونعالجهم كلهم .

• ولد حظوا ان

- 5- It is *rarely* necessary to *do a tracheostomy as a first aid measure*, but if needed it can be *performed later as an elective procedure after the airway is established*. If *urgently needed*, a *cricothyroidotomy* is a similar and faster procedure.
- 6- Cervical spine immobilization if needed is done by using a backboard & a rigid collar.

Breathing:**Assessment:**

- 1- **Inspection** for chest movement, respiratory rate, cyanosis, open wounds & expansion.
- 2- **Palpation** for subcutaneous emphysema & flail segments.
- 3- **Percussion** for hyperresonance or dullness.
- 4- **Auscultation** for air entry & adventitious sounds.

Life threatening conditions in chest injuries management: (see chest injuries).

Circulation: This entails:

- control of hemorrhage (discuss)
- anti-shock measures
- CPR for cardiac arrest
- ECG monitoring

Disability: (brief neurological examination)

AVPU evaluation: according to best response, it is classified as follows:

- Alert & interactive.
- Vocal stimuli elicit a response
- Painful stimuli are needed to produce a response
- Unresponsive.

Exposure & Environment:

- 1- Remove all clothes using sharp large scissors.
- 2- Keep the victim & place warm to avoid hypothermia.
- 3- Insert urethral catheter & nasogastric tube.
- 4- Radiological examination.
- 5- Proper history taking **AMPLE:** Allergies, Medications, Past medical history, Last meal time & Events of injury.

2- Secondary survey:**Objectives:**

- 1- Full patient examination.
- 2- Complete medical history.
- 3- ~~Integration of all available data.~~
- 4- Formulation of a management plan.

It includes examination of : *كل حاجة*

- Head & neck
- Face & spine
- Chest & abdomen
- Perineum (including rectal & vaginal examinations)
- Limbs: for fractures & soft tissue injuries.
- Nervous system

3- Definitive treatment of individual injuries: according to its site (see before).

Fluid, electrolytes & acid-base balance

X Physiological considerations

Body water:

- Total body water varies from 45 – 75% of body weight.
- 2/3 of the water is intracellular while the other 1/3 is extracellular.
- Extracellular fluid is subdivided into the interstitial compartment & intravascular compartment.
- Water distributes freely & its source is either exogenous or endogenous.
- Water loss is usually through lungs, skin, feces & urine.

Electrolyte:

Sodium:

- Main extracellular cation that plays the main role in maintaining blood volume.
- Adrenal corticoids, mainly aldosterone, control reabsorption of sodium in renal tubules.

Potassium:

- The major intracellular cation.

Calcium:

- Serum calcium (8.5 – 10.5 mg/dl) is found in ionized & non-ionized (protein bound) forms.
- Alkalosis decreases the ionized form & may lead to tetany.
- It is controlled by vitamin D, PTH, Calcitonin, kidney & small bowel state.

Acid – Base regulation: (7.4 ± 0.04)

- Renal regulation by HCO_3^- reabsorption & H^+ excretion.
- Respiratory regulation by rate of CO_2 elimination.

Diagnosis of imbalances

History: e.g., vomiting, diarrhea, or excessive sweating.

محتدل نظری
مجتش قبل کدا

Clinical signs

- Vital signs, pulse and blood pressure.
- Urine output & Tissue turgor.
- Edema & crepitations.
- Central venous pressure (CVP), and pulmonary artery wedge pressure (PAWP)

Laboratory values:

- 1- Hematocrit & hemoglobin.
- 2- Serum sodium & potassium.
- 3- Arterial blood gases (ABGs) to obtain Blood pH, PO_2 and PCO_2 & HCO_3^- .

Water imbalance

من الماء

<i>Water depletion (Pure dehydration)</i>	<i>Water excess (water intoxication)</i>
A) Causes:	A) Causes: Often iatrogenic e.g.:
1) Lack of water intake. 2) Diabetes insipidus. 3) Increased output e.g. in fever & osmotic diuretic.	1) Over-infusion of 5% glucose solution to postoperative patients. 2) Colorectal washouts with plain water 3) TURP syndrome
B) Clinical Picture	
• Intense thirst and weakness. • Decreased tissue turgor. • Oliguria.	• Increased urine volume. • An increase in body weight. Pitting edema usually does not develop. • Decreased serum sodium concentration and falling hematocrit value. • Rarely, swelling of brain cells leads to drowsiness, weakness & convulsions and coma (Water intoxication).
C) Management	
• Na-free water according to the estimated deficit. If water depletion is severe, at least 1/2 of the estimated deficit should be replaced in the initial 12 hours of treatment. 5% glucose is given IV.	• Restriction of water intake. • forced diuresis with Mannitol • In severe cases IV administration of small amounts of 5% sodium chloride solution.

Sodium imbalance

محتل نظري

<i>Sodium depletion (Hyponatremia)</i>	<i>Sodium excess (Hypernatremia)</i>
Causes	
1- Abnormal gastrointestinal tract losses (Suction, vomiting and diarrhea). 2- Loss of ECF, either externally (burns, marked sweating) or internally as a third space (peritonitis, ascites or ileus). 3- Excessive urine sodium loss e.g. (diuretics). 4- Blood loss. 5- Restricted dietary intake. 6- Adrenocortical insufficiency.	1- Giving excessive amount of 0.9% saline solution intravenously during the early postoperative period. 2- Hyperaldosteronism: 1ry (Conn's syndrome) or 2ry to liver cirrhosis. 3- Cushing's syndrome.
Clinical Picture	
1) Eyes are sunken. In infants the anterior fontanel is depressed. 2) The tongue is coated and dry. 3) Peripheral veins are collapsed. 4) Hypovolemia, with low CVP, results in tachycardia, orthostatic hypotension and shock. 5) There is hemoconcentration with normal or slightly reduced serum sodium.	1) Slight puffiness of face is the only early sign. 2) Edema, the only reliable clinical sign. 3) Weight gain. 4) Hypertension. Serum sodium concentration is usually normal.
Treatment	
1) Restoration of ECF volume by appropriate amounts of Na- containing fluids such as normal saline (NaCl 0.9%) or Ringer's lactate. 2) Blood losses should be replaced.	• Sodium restriction. • Diuretics.

Potassium imbalance

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حت قبل کوا

<u>Potassium depletion (Hypokalemia)</u> ★	<u>Potassium excess (Hyperkalemia)</u>
Causes	
1) Vomiting as occurs in gastric outlet obstruction, e.g. pyloric obstruction. 2) External GIT fistulae 3) Diarrhea especially when severe. 4) Certain types of diuretics as frusemide. 5) Alkalosis & Hyperaldosteronism.	1) Renal failure. 2) Acidosis. 3) Diabetic patients.
Consequences	
• Raises membrane excitation potentials, making nerves & muscles less excitable. • Risk of supraventricular arrhythmias. • Increases the susceptibility of hepatic coma in patient with liver disease.	• Stimulation of aldosterone secretion (K^+ level 5mmol/L) • Decreases membrane excitation potentials, making cells more excitable.
Clinical Picture:	
• Most patients are asymptomatic. • Malaise and weakness. The speech is slow. • Paralytic ileus and distension may be seen. • Muscular paresis appears only with extreme depletion. • ECG reveals prolonged QT interval, depression of the ST segment, and a lowering or inversion of the T wave.	If the serum potassium exceeds 7mmol/L, intracardiac conduction is slowed and arrhythmia, bradycardia and hypotension may be followed by cardiac arrest. The ECG is a sensitive investigation for hyperkalemia. It shows a wide QRS complex and peaked T waves.
Treatment:	
The required quantity of potassium is added to the infusion and distributed all over the day. Potassium should never be injected as a bolus. Safe rules for giving potassium are: - a- Urine output at least 40 ml/hour. - b- Not more than 40 mmol added to 1 liter. - c- No faster than 40 mmol/hour.	1) IV calcium gluconate as calcium antagonizes potassium. 2) IV sodium bicarbonate. 3) Dextrose and insulin infusion 4) If the previous measures fail, they should be followed by giving exchange resins. 5) If all the previous measures fail to lower the serum potassium, dialysis should be started.

Calcium imbalanceHypocalcemia:

- It may be transient or latent.
- It is due to hypoparathyroidism, acute pancreatitis & acute alkalosis.
- The clinical manifestations include hyperactive deep tendon reflexes, muscle & abdominal cramps, carpopedal spasm & rarely convulsions. Positive Chvostek's sign can be elicited.
- ECG shows prolonged QT interval.
- **Treatment:** is by correction of underlying cause & IV injection of calcium gluconate or calcium chloride in acute cases.
- In chronic cases, vitamin D, oral calcium supplements & aluminum hydroxide gels are given.

Postoperative fluid and electrolyte therapy

محصل نظري
شام لحياتك

In prescribing fluid regimens for postoperative patients, three points are considered:

- 1- Basal requirements. *3 Litres / day*
- 2- Pre-existing dehydration, electrolytes loss and acid-base disturbances.
- 3- Continuing abnormal losses.

The daily requirements of water and electrolytes in an adult are:

تقريباً ٣ لتر • Water: 35mL/kg, Sodium: 1 mmol/kg & Potassium: 1 mmol/kg

The usual daily postoperative fluids for uncomplicated surgery in an adult:

- Three liters of fluids. Add 200ml per day for each 1°C rise in temperature.
 - 500 ml saline (0.9% NaCl) provides the daily requirements of Na & Cl.
 - The remaining volume requirement (2.5 L) is given as 5% dextrose (glucose).
- Potassium supplements are given after 48 hours

Preoperative evaluation of hemostasis

History:

1. Family history of bleeding & history of bleeding tendency
2. Age at onset of bleeding.
3. History of chronic liver & renal failure, massive blood transfusion and drug intake.
4. Characters of the bleeding
 - Defects of 1ry hemostasis (platelet/vessel abnormalities). Bleeding is superficial.
 - Defects of 2ry hemostasis (coagulation/fibrinolysis). Bleeding is deep.

Examination

1. Signs of liver disease
2. Skin and mucous membranes are examined for bleeding, petichae, or bruising.
3. Cavernous hemangioma may trap platelets leading to thrombocytopenia.
4. Musculoskeletal system e.g. hemoarthrosis (coagulopathy)

Tests of Hemostasis:

Tests of primary hemostasis:

1. Platelet count & bleeding time.
2. Bone marrow aspiration and biopsy.
3. Tests of platelet function (adhesion, release, aggregation)

Tests of secondary hemostasis PT, PTT & TT

Hemorrhage

Classification of hemorrhage

Hemorrhage may be classified according to:

1- Site:

- a) External: Bleeding is visible as it occurs through the skin as in wounds or from a body orifice as in epistaxis or hematemesis.
- b) Internal: Examples are hemoperitoneum and hemothorax.
- c) Interstitial: Bleeding occurs into the tissues forming a hematoma. e.g. fracture hematoma.

2- Type of disrupted vessel:

- Arterial: The blood is bright red in color and comes in pulsatile jets. The bleeding is more from the proximal than the distal end.
- Venous: The blood is dark red in color and comes as a steady flow. It is more from the distal than the proximal end.
- Capillary: Bleeding occurs as diffuse ooze of bright red blood.

3- Timing in relation to the onset of trauma:

- Primary hemorrhage occurs at the time of trauma.
- Reactionary hemorrhage occurs some hours after trauma (within 24 hours) due to slipped ligature or dislodged clot.
- Secondary hemorrhage occurs one to two weeks after trauma due to infection eroding a vessel wall.

4- Etiology:

Hemorrhage may be:

- Traumatic:
- Pathological:
 - Atherosclerotic (ruptured aortic aneurysm).
 - Inflammatory (bleeding peptic ulcer).
 - Neoplastic (hematuria in renal cancer).

c) Bleeding diathesis (spontaneous hemorrhage)5- Hemorrhage can be classified into 4 classes:

احفظ ٤-٥ نقط من دوتك

Parameter	Class I	Class II	Class III	Class IV
Blood loss	Up to 15% (750ml)	15-30% (750-1500ml)	30-40% (1500-2000ml)	>40% (2000ml)
Mental status	Normal to anxious	Anxious to restless	Aggressive to drowsy	Drowsy to unconscious
Skin	Normal	Pale & cold	Paler & colder	Pale & very cold
Capillary refill	Normal	>2 seconds	>2 seconds	>2 seconds undetectable
Pulse/min.	<100	100-120	120-140	>140
Systolic BP	N	N (Supine)	Low	Low
Diastolic BP	N	High	Low	Low
Pulse pressure	N	Low	Low	Low
RR	14-20	20-30	30-35	>35
Urine output	>30 ml/hr	20-30ml/hr	10-20ml/hr	0-10ml/hr

Physiological response, C/P, management: See hypovolemic shockEstimating blood loss:

This is obtained from:

- Clinical data. **الحدود**
- Types of injury e.g. fracture of pelvis (2000 – 3000 ml).
- Blood loss at operation is the sum of the amount in the suction reservoir and the amount mopped up by the swabs.

Investigations:

A blood sample is obtained for:

- 1- Complete blood picture, including hematocrit.
- 2- Coagulation profile.
- 3- Cross matching.

Excessive operative & postoperative bleeding**Causes:**

- 1- Inadequate surgical hemostasis (commonest cause) جراح میں کو بر
- 2- Hemorrhagic diathesis not detected preoperatively.
- 3- Acquired intraoperative coagulopathy e.g. DIC & massive blood transfusion.

Management:

- 1- Replace amount of blood loss.
- 2- PT, PTT & platelet count.
- 3- Fresh Frozen Plasma (FFP) 3 – 4 units initially & Platelet transfusion if needed.
- 4- Proper surgical hemostasis.

Surgical hemostasis

During surgery the bleeding is controlled by one of the following methods:

- 1- Ligation.
- 2- Under-running suture.
- 3- Electrocautery (diathermy): to stop bleeding from small blood vessels, either Monopolar or Bipolar.
- 4- Clips, Laser.
- 5- Repair of injured large vessels (see arterial).

زمان کان لورا حد مائتہ و ملل

نظریہ ہمار

Blood transfusion

بہت سے دلوں میں

Blood components:**1- Packed red cells:**

The transfusion of packed red cells is very useful in anemic patients, in the elderly and in cardiac patients as it improves the oxygenation ability without overloading the circulation.

2- Fresh plasma:

It is rich in platelets and coagulation factors.

3- Fresh frozen plasma:

Plasma removed from fresh blood is rapidly frozen and stored at -40°C. It is a good source of all the coagulation factors. من شہرہ ہمار

4- Platelet concentrates:

Should be freshly prepared as half life of platelets is very short.

5- Cryoprecipitate:

This is prepared from fresh frozen plasma and is very rich in factor VIII and fibrinogen. It is stored at -40°C.

Indications for transfusion of blood & its products:

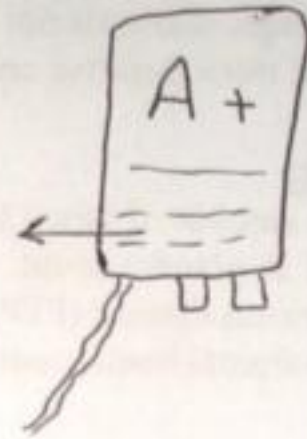
جدول وزارت

	Indication	Precautions	Storage
Whole blood	• Class III & IV hemorrhage.	ABO & Rh incompatibility.	21 days.
Red cell concentrates	• Severe anemia.	ABO & Rh.	21 days.

كلام لحياتك:

* الدم ينتقل من عروق بين من نقل امراض ، لكن عامة من مليون اختبار فمحدث يلق

* نان حبة خاينين منها ~~الطبيب~~ ولو انما ناسرة جداً ، ويتحصل مرة من السنة ويتغير فيما تحقيق ونيا



حبات Citrates حشان مع Ca في دم العيان

يعملوا Citrates مع Ca ودا بيخلص الدم سائل من نير ما يتجلط

* اول 5 cm اديهم براحه عنان لوفيا ~~الطبيب~~

لقبان على طول لوعدا ومحصلش مشاكل افتح العنفيه

ملحوظة : مش اي حقونيه ررعه تبقى ~~الطبيب~~

لان عمل حدآ يبقى في Allergy

* ممكن عمل ~~الطبيب~~ خاصة لورجل كبير فاك فضل نقل ~~الطبيب~~

الكل

* كلنا عندنا ~~الطبيب~~ في الدم ، بس لما بنحطه في الخلاجه ~~الطبيب~~

مش ~~الطبيب~~ ، لكن لو دفيت الدم ممكن ~~الطبيب~~

ويبوظ الدم ~~الطبيب~~

* دكتور رفته ~~الطبيب~~ يقول ممكن تنقل ~~الطبيب~~ كيسين دم ساقين

من غير اي مشاكل

Fresh frozen plasma	- Bleeding due to non-specified coagulation factor deficiency. - Coumarin overdose.	ABO	One year at -40°C.
Platelets concentrates	Primary or secondary thrombocytopenia.	ABO	24-72 hours.
Cryoprecipitate of factor VIII & fibrinogen.	Bleeding with fibrinogen depletion.		One year at -40°C.
Factor VIII	Hemophilia A		2 years
Factor IX	- Hemophilia B - Coumarin overdose.		
Albumin 5% or 20%	Hypoalbuminemia		4 years

قابلية
مشاركة
بعض

N.B.: It is no longer recommended to transfuse fresh blood to correct coagulopathies. The specific deficient component should be used.

Complications of blood transfusion:

A.H. مستطيل

Though generally safe and simple, the procedure of blood transfusion is not free of complications. The majority of these are simple, yet some are immediately fatal and others produce chronic serious illness as hepatitis and AIDS. Attention to strict rules of donation and administration of blood greatly reduces the incidence of these complications.

I- In the donor:

- Neurogenic shock.
- Anemia if repeated amounts are taken. → ناس يبيعير الدم
- Local thrombophlebitis in the veins.

II- In the recipient:

- Pyrogenic reactions: The most common.
 - C/P:** Chills, fever, headache, nausea and vomiting.
 - Due to:** either minor bacterial contamination or some pyrogens in the transfusion apparatus. مترميش الكيس ، لد ادى عتقهم وكل بعد كدا
- Allergic reactions:
 - C/P:** Range from mild itching & urticaria to severe reaction with laryngeal edema & collapse.
 - Due to:** The recipient's response to allergens in the donor's blood.
 - Treatment:** Is by antihistaminics and corticosteroids. If the reaction is severe, blood transfusion should be stopped.
- Congestive cardiac failure:
 - Occurs in** elderly persons especially if a large volume of blood is administered too rapidly.
 - C/P:** See medical notes.
 - Prevention:** It is recommended to transfuse packed red cells rather than whole blood to correct anemia in elderly persons.

4- Hemolytic reactions:

- **Due to:** presence of antibodies in the recipient's blood against antigens in the donor's cells.
- **Clinically:**
 - After the transfusion of less than 50 ml: fever, chills, constricting pain in the chest, dyspnea and pain in the flanks.
 - In anesthetized patients there will be sudden tachycardia, hypotension & bleeding tendency.
 - A major hemolytic reaction will lead to hemoglobinuria, jaundice & acute renal failure.
- **Management:**
 - Stop the transfusion immediately. ★ أول خطوة
 - Repeat typing →
 - Correct shock by infusion of crystalloid solution (Lactated Ringer) & IV corticosteroids. عشان تدخل بتوخ بنك الدم السجين
 - An osmotic diuretic as mannitol may be needed. Keep urine alkaline to protect against ARF
 - If ARF develops, it must be treated.

5- Transmission of infection:

- Viral hepatitis (B or C):** This is now the most feared complication. Whole blood or blood products can transmit the virus. It is now obligatory to test donor for hepatitis viruses.
- AIDS infection.**
- Septicemia:** Bacteria can survive, but they cannot multiply significantly in refrigerated blood. However, if the blood is allowed to warm, bacteria can grow and Gram-negative endotoxins can cause septicemic shock.

6- Hyperkalemia:

- With prolonged storage of blood, there is progressive loss of potassium from erythrocytes into the plasma.
- Transfusion of several units of aged blood may produce cardiac arrhythmias or even arrest due to hyperkalemia.

7- Citrate intoxication:

- Excess citrate will bind to the recipient's calcium leading to hypocalcemia that augments the effects of hyperkalemia on the myocardium.
- **Prevention:** If more than 2 units of blood are administered, it is important to administer 10 ml of 10% calcium gluconate for each two units of blood.

8- Air embolism. → in case of central line.9- Complications of massive blood transfusion:

Definition: Transfusion of 2500 ml of blood at one time or 5000 ml or more over 24 hours.

- Hypothermia:** A special warming unit should be used to warm blood before transfusion.
- Hyperkalemia.**
- Hypocalcemia.**
- Coagulation failure:** As stored blood is poor in platelets, factor VIII and factor V. In these situations it is recommended to transfuse one unit of fresh frozen plasma and platelets for every unit of stored blood.
- Diminished O₂ carrying capacity of RBC's**

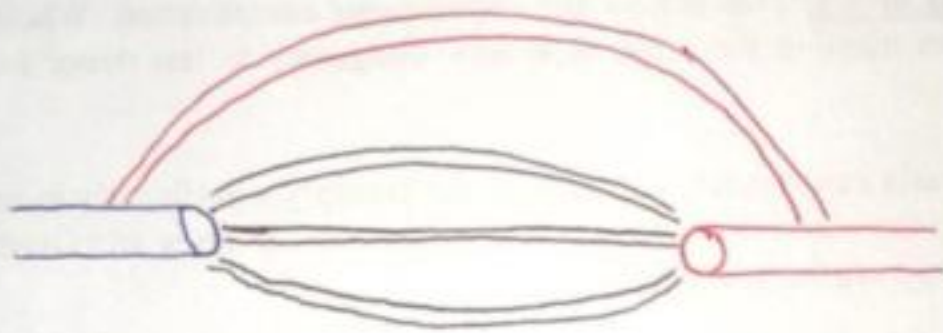
Shock

Shock doesn't mean loss of Function ← لحياتك ولعرك ←

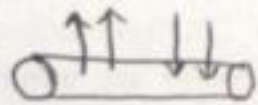
The shocked patient is irritable & he is alert till death.

* قصة الرعد التي كان لشوكة وذكورتي كان سبب من انقاده
وليد اما ~~ف~~ خف قال لذكورتي اننا كان جامع كل حاجة .

Shock usually is not an acute event , & usually it is gradual
ولدرج تشخصه بدري .



* blood which come from artery → return completely through venule.



2 forces push out & 2 forces
push blood in capillaries so
out come is the same volume of blood.

* من حالة ال Shock ← اهم حاجة لوال Brain & heart

So body produces V.C. of all precapillary sphincters of
all the body except heart & brain → so blood is shifted to
these organs only.

- * also this V.C. decreases hydrostatic pressure inside capillaries →
This causes capillary refill & tissues become dry & wrinkled.
- * also hormones produced → hyperglycemia.

The physiological changes which occur during blood storage:

	0 day	7 th day	14 th day	21 st day
% Of red cells viability	95%	90%	85%	75%
% Of platelets viability	95%	0%	0%	0%
% Of coagulation factor V & XIII	95%	30%	30%	30%
Potassium content (mmol/L)	3.5	10	25	30

A.H. مستطيل

How to minimize the need for homologous blood transfusion?

- 1- **Autologous blood transfusion:** The patient, who is going to have a major elective operation, can donate some units of his own blood over several days. The blood is kept in the refrigerator to be given back to him during surgery.
- 2- Preservation of the blood lost during surgery and its reinfusion to the patient. This needs a special apparatus (**cell saver**).

Shock

فهم جيداً نظري

Definition:

Shock is a pathophysiologic condition that leads to inadequate tissue perfusion through the microcirculation with impaired cellular metabolism.

Classification:

1. Hypovolemic shock

2. Cardiogenic shock

3. Neurogenic shock

4. Anaphylactic shock

5. Septic shock

6. Endocrinal shock

→ Acute heart Failure → Vasovagal
 → 2 types → Spinal anesthesia
 it is steroids, anti-histamines & fluids
 Acute suprarenal Failure

I- Hypovolemic Shock

it is sleep flat, elevate legs, fluids, ± Vasoconstrictors.

It is due to diminished blood volume, which may occur secondary to loss of:

- 1- **Blood:** As in internal or external hemorrhage.
- 2- **Plasma:** As in burns and peritonitis.
- 3- **Fluids:** As in severe vomiting, diarrhea & intestinal obstruction.

Physiological response to hemorrhage: (The classical example of hypovolemic shock)

The physiological response to hemorrhage has two aims:

- 1- **Stopping the bleeding** by immediate vasoconstriction and retraction of the intima with subsequent clotting. These mechanisms are more effective when the vessel is completely transected than when there is a side tear, and in traumatic than in pathological cases.
- 2- **Maintaining effective circulatory volume & perfusion of critical tissues** (brain & heart), at the expense of less critical tissues (skin, skeletal muscle & splanchnic area).

* Capillaries are dilated $\rightarrow$ sluggish circulation $\rightarrow$ thrombosis & DIC.

* if the pt. loses 15% of blood (750 ml) $\rightarrow$ physiological response
Compensate it.

- * if the pt. loses 30% of blood (1.5 litre) $\rightarrow$ class II & he doesn't need blood transfusion $\rightarrow$ only fluids are enough.

* if more than 1.5 litres ^{or 2 litres} → class III or IV we give him fluids & we also give blood to replace the blood loss.

انت لفتتلا دم قد الى فقهه بالاضط

x یعنی لولیت دکتور طالب کیس دم واحد عثمان یغذ حاله کلسک یبق
مش بیفهم ای حاجه لدن لوکان کیس یغذه دایبق کان السهر رنی
لا ارمط وکناتہ علیہ السلام ال طمساف

* طیب نفترض ان کان $\bar{L}A, \bar{L}A'$ و ملقائے غیر کیس واحد یجی لند یہ
برضو طبعاً .

* لكن عادة فتح الكلام من لا إله إلا الله يبقى ١٣ أو ١٤ أكتبا سر وم

This is achieved by.

- a) **Neural factors:** Stimulation of the sympathetic system, with the following effects:
 - Constriction of veins displaces blood from the capacitance side of circulation into the heart.
 - Constriction of arterioles raises the peripheral resistance. It involves mainly the arterioles of the skin, skeletal muscle, and splanchnic area.
 - Increased rate and strength of cardiac contraction.
 - **Transcapillary refill:** Constriction of arterioles causes a fall in capillary hydrostatic pressure and promotes movement of fluid from the interstitium into the capillaries. *This causes dry tongue & wrinkled skin.*
- b) **Endocrine response:** is mediated through the following mechanisms:
 - **Catecholamine:** They increase the heart rate and myocardial contraction and cause constriction of the arterioles of the skin, kidney and viscera.
 - **ACTH, Cortisol, growth hormone & glucagon are increased:** Leading to hyperglycemia which increases extra-cellular fluid (ECF) osmolarity & withdraws water from the intracellular fluid (ICF). This increases effective blood volume.
 - **The renin-angiotensin aldosterone system:** Angiotensin II is a powerful vasoconstrictor and stimulates sodium and water retention by a direct action on the kidney as well as indirectly through release of aldosterone.
 - **Vasopressin (ADH).** *that's why the patient has oliguria.*

These mechanisms allow survival without therapy for losses up to 15% of the blood volume.

The only inevitable loss of fluid is sweating due to sympathetic stimulation

3- Microcirculatory changes:

- a- Under the effect of catecholamines the precapillary sphincters constrict.
- b- *Shock* Untreated hypovolemia thus leads to hypoxia. Under ischemic conditions, the body reacts by opening more capillaries. The results are:
 - Further slowing of capillary circulation
 - Spontaneous coagulation of blood in these capillaries. If extensive, it is called disseminated intravascular coagulation (DIC).
- c- A sluggish circulation and DIC aggravate tissue hypoxia and affect the function of capillary endothelium.

4- Cellular Derangement:

- a- Lack of oxygen forces the cells to rely on anaerobic glycolysis which produces lactic acid
- b- With persistent hypoxia, cellular functions start to deteriorate.
- c- The end result is rupture of lysosomal and plasma membranes and cell death

5- Acid-base imbalance:

Shock is accompanied by metabolic acidosis, which is caused by:

- a- Accumulation of lactic acid.
- b- Renal failure.

6- Effect on individual organs (see later)

Clinical picture:• **Symptoms:**

- 1- **Weakness and fainting** especially when standing.
- 2- The patient feels **cold and thirsty**.

صعب ادى عيان ال Shock يمشى

لو عيان يمشى ادى الى الميا فخذ بالك
(ان احتمال يمشى ل Shock)• **Signs:**

- 1- **The mental status:** may vary from anxious to drowsy but the patient usually remains alert.
- 2- **Pulse and blood pressure:** With mild blood loss (less than 500 ml), the pulse & blood pressure may remain normal. With more blood loss, tachycardia develops but blood pressure remains stable. With more progressive blood loss, progressive hypotension develops. *Systolic drops more as peripheral resistance is high.*
- 3- **Pulse pressure (PP):** decreases leading to a thready pulse.
- 4- **Respiratory rate:** Tachypnea & air hunger due to chemoreceptor stimulation by hypoxemia & acidosis.
- 5- **Temperature:** Hypothermia occurs.
- 6- **Skin:** becomes pale, cold (vasoconstriction) & clammy with slow capillary refill & collapsed veins.
- 7- **Oliguria.**

عيان يلقف هوا

- **If the patient is rapidly treated by adequate volume replacement, his vital signs will rapidly return to normal.**

• **If not, the following will occur:**

- 1- **The heart:** Myocardial contractility is impaired by direct myocardial depressants as cachectin, tumor necrosis factor (TNF). *قلوبهم يداوا بدولوا و يمشى هلاي النفاي*
- 2- **Intestine:** translocation of depressing substances (bacteria and endotoxins) from the ischemic gut into the circulation that may be a factor in the development of multiple organ system failure.
- 3- **Stomach:** true stress ulcers.
- 4- **The liver:** ischemic Hepatic dysfunction is a frequent component of MOSF.
- 5- **Renal affection:** Prolonged hypotension ends in acute tubular necrosis which is a part of the multiple organ system failure.
- 6- **Pulmonary response:** ARDS occur as pan of MOSF.

Irreversible shock: *opening of all pre-capillary sphincters.*

- Complete vascular collapse with hypotension unresponsive to volume or drug intervention leading to lethal central nervous system and cardiac dysfunction.

It is related to:

- 1- **The duration and volume of hemorrhage.**
- 2- **The age.**
- 3- **Pre-existing cardiovascular fitness of the patient.**
- 4- **The presence of massive trauma.**

In case of Septic shock
1- severity of infection.
2, 3, No X

- **Before the conclusion that irreversible shock has occurred, other causes of failure to respond to therapy should be resolved:**

1. **Continuing unsuspected blood loss into the chest or abdomen.**
2. **Inadequate volume replacement.**
3. **Occult thoracic injuries including cardiac tamponade.**
4. **Acute myocardial insufficiency**

Monitoring the severely shocked patient:

The aim is to check the adequacy of replacement:

- 1- **Clinical parameters:** Pulse, blood pressure, state of filling of veins, capillary perfusion and urinary output every hour.
- 2- **Central venous pressure (CVP):** To measure the CVP, a cannula is placed in the right atrium via the median-cubital vein, the subclavian vein or the internal jugular vein. The normal pressure is 5 – 10 cm of water. Assuming that cardiac function is normal a high pressure indicates overtransfusion and the possibility of pulmonary edema, while a low pressure indicates hypovolemia.
- 3- **Pulmonary artery wedge pressure (PAWP):** By the use of a *Swan-Ganz catheter*.
- 4- **ECG:** *to detect if pt. develops Cardiogenic shock, as if you give fluids in Cardiogenic*
- 5- **Temperature:** A simple non-invasive method of assessing cardiac output and peripheral perfusion is to measure the difference between the peripheral and core rectal temperature. *يتم قياسه في المستقيم*
- 6- **Blood gases:** *indication for artificial ventilation is PO₂ below 60 mmHg or PCO₂ above 60 mmHg*
 - PO_2 is normally between 80 - 100 mmHg.
 - PCO_2 is normally between 35 - 45 mmHg.
- 7- **Repeated hematocrite & hemoglobin.**

Treatment of hypovolemic shock:

- 1- **Stop the hemorrhage (if the cause of shock was hemorrhage, the classic example of hypovolemic shock):**

- **First-aid treatment:**

- a) By packing, pressure, and position. *لضغط من الخارج*
- b) A skin wound is covered by a dressing, (any clean material), and pressure is applied manually, by a sphygmomanometer cuff or by a bandage.
- c) Elevation of the limb above the heart level stops venous & decreases arterial bleeding.

- **Tourniquets are contraindicated because of complications unless the limb is going to be amputated.** *مرفوض تربط Tourniquet لأنه بيتسبب وذمة ويدخل من gangrene*

- **Operation includes:**

- a) **Primary hemorrhage:** It is treated by controlling the bleeding point either by ligature or diathermy coagulation.
- b) **Reactionary hemorrhage:** Open the wound & deal with the bleeding vessel as above.
- c) **Secondary hemorrhage:**
 - i) The wound is packed with antibiotics and sterile dressing.
 - ii) Antibiotics are given systemically.
 - iii) If the bleeding is not controlled in this way → re-open the wound and drain the infection. The vessel is then exposed & the wound is ligated.

- 2- **Restore the blood volume:**

Volume replacement depends on the class of the hemorrhage:

Class II hemorrhage. (15-30% Blood Loss):

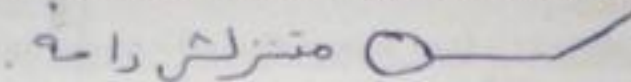
- The replacement solution is lactated Ringer's → *most physiological solution*.
- The amount is 3 times the estimated deficit (~ 3L).
- **Administration:** Two liters are given as a bolus and the response is monitored. If there is definite improvement: the remaining liter is given more slowly, (a hematocrit <30 requires blood transfusion).

Class III and IV (30-40% & Blood Loss of > 40%):

- The management is as for class II but these patients need blood transfusion.
- The initial volume of transfused blood is that of the estimated deficit (1500 - 2000 ml).
- Clean blood in the thorax or abdomen can be aspirated, anticoagulated and then transfused back into the patient (auto-transfusion) if a cell-saver is available.
- In the absence of whole blood: many substances have been proposed as human plasma, albumin solution, dextran and artificial blood substitutes.

3- Positioning:

Elevate both legs while maintaining the trunk and the remainder of the patient in the supine position.

4- Pulmonary support:

Oxygen is administered through a facemask, nasal catheter or an endotracheal tube.

5- Analgesia:

Morphia 3-5 mg (poorly absorption from subcutaneous sites), Morphine is contraindicated in head injury and in cases of respiratory and liver insufficiency.

6- Inotropics:

- They are the second line of treatment.
- Dopamine & dobutamine are the most widely used; both improve myocardial contractility, while dopamine ↑ renal blood flow.

7- Monitoring.II- Septic Shock

This is the most serious type of shock and the most difficult to treat, having an overall mortality exceeding 30% and is exceeding 80% if with MOSF.

Etiology:

- The incidence of Gram -ve sepsis is rising due to:
 - 1) Development of resistant and virulent organisms.
 - 2) Concentration of infected patients in critical care units.
 - 3) More extensive operations in elderly and poor-risk patients.
 - 4) Salvage of severely injured patients.
 - 5) Patients who are immunosuppressed by organ transplantation, radiotherapy and chemotherapy.

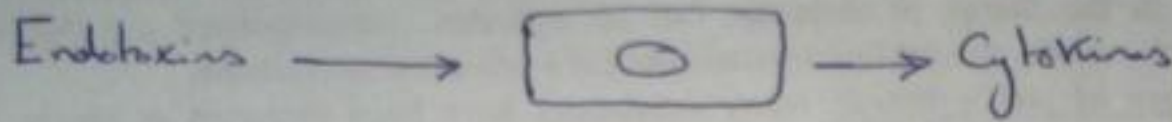
Predisposing factors: = Type of patient.

Old age, diabetes mellitus, corticosteroids, chemotherapy intake and malignancy.

Causative organisms:

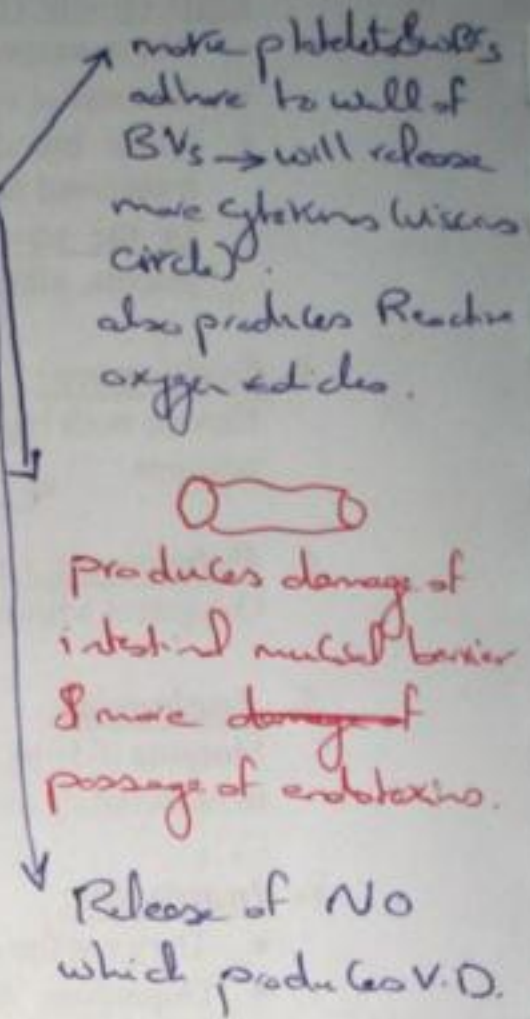
- Gram -ve bacilli (commonest).
- Staphylococci.
- Candida.

Pathophysiology of Septic Shock:



- Also cytokines opens A-V Shunts so blood bypasses tissues.

وحتى الدم الى يوصل tissues فيه endotoxins



How to treat this pt?

Stop production of endotoxins → look for peritonitis, —

Support the whole body functions & wait for improvement.

وبديلا والتر Fluids عن V.D. مجر.

* يتوصل الى MOF اصغر بكثير من Septic shock لان ال blood bypasses tissues.

Clinical pic:

ازاي تشخص العيان من حالة hyperdynamic state قبل ما يدخل في

! hypodynamic

مالتوقع ، بين ثلث واحد

Source of Gram -ve sepsis:

- 1- Peritonitis caused by perforated viscus, gangrenous bowel or leaking anastomosis.
- 2- Cholangitis or genitourinary infections.
- 3- Infected central venous catheter.

Pathophysiology:**a. Mediators cascade:**

Under the influence of endotoxins, macrophages release **cytokines** that cause the following major problems:

- 1- **Platelets and leucocytes adherence to the vascular endothelium which leads to:**
 - a) **Impairment of microvascular perfusion.**
 - b) **Local release of cytokines and free oxygen radicals that damage the vascular endothelium.**
- 2- **Damage of the barrier function of the intestinal mucosa** allowing intestinal pathogens into the circulation.
- 3- **Excessive production of nitric oxide** by the vascular endothelium which is a potent smooth muscle relaxant leading to the decreased peripheral resistance.

b. Microcirculation:

- 1- Under the effect of cytokines vasodilatation of the arteries occurs and **arterio-venous shunts** are opened.

The results are:

- Reduced peripheral resistance.
- Capillaries are bypassed & Oxygen delivery to the tissues is impaired.

- 2- **Disseminated intravascular coagulation (DIC)** is the result of sluggish capillary circulation.

c. Cellular derangement (see hypovolemic shock)

It is to be noted that oxygen uptake & utilization by cells is also directly suppressed by the toxins

d. Acid-Base imbalance (see hypovolemic shock)**e. Individual systems and organs (see hypovolemic shock).****Clinical picture:****1- Hyperdynamic (warm) septic shock:** ★

توقع العيان

Diagnosis is difficult and a high index of suspicion is required to detect cases at this early stage. The patient has:

- Restlessness and confusion.
- Fever above 38°C and chills.
- Mild reduction in blood pressure.
- Tachypnea & Tachycardia.

- Patient is flushed with warm dry extremities, *due to opened A-V shunts.*
- Oliguria.
- The cardiac output is elevated.
- Prompt and aggressive treatment of the patient at this stage can lead to survival.

2- Hypodynamic (cold) septic shock:

If the previous stage is not treated efficiently, the patient will develop a picture similar to that of hypovolemic shock with reduced cardiac output.

- Systolic blood pressure < 90 mmHg.
- Tachycardia and tachypnea.
- Cold clammy skin.
- Oliguria.
- Multiple organ failure starts at this stage (**MOSE**)
- Efficient and early treatment of the patient at this stage, can convert him to the hyperdynamic stage. The mortality rate of a septicemic patient with multiple organs failure exceeds 80%.

Diagnosis:

Helped by:

- Polymorphnuclear leucocytosis.
- Finding high lactate level in blood.
- Looking for a source of sepsis.
- Repeated blood culture at the peak of fever or culture from the septic focus.

Monitoring: See hypovolemic shock.**Treatment:**

It is better to treat these patients in an intensive care unit.

I- Support of different systems:**1- Cardiovascular support:****□ Fluid replacement:**

- Prompt correction of fluid deficit is essential.
- Ringer's Lactate is usually used.
- Huge quantities of fluids are often needed
- The amount often exceeds 10L within a few hours.
- Packed R.B.C.'s transfusion may be indicated in cases with low hematocrite.

□ Medications:

- Inotropic drugs as dopamine & vasopressor drugs as norepinephrine can be used in patients with persistent life threatening hypotension inspite of active measures of treatment.

2- **Respiratory support:** Oxygen administration is essential for all types of shock. Usually 100% oxygen is administered as a start, and is later adjusted according to the response. If the arterial oxygen is mildly reduced oxygen by mask will be sufficient. Reduction of its level below 60 mmHg calls for endotracheal intubation and mechanical ventilation.

3- **Renal support:** Adequate volume replacement & dopamine administration improve renal blood flow.

II- Fighting infection:

1- Immediate recognition and early eradication of the source of sepsis.

2- **Antibiotics:** The choice of antibiotics will depend on the possible suspected organisms. The most commonly used combination is cephalosporin, aminoglycosides & metronidazole.

N.B.: Steroids are not indicated in the treatment of septic shock.

زمان کا اس معینہ میں اس کیس کی
میں لکھوا ان کے لیے اس کیس کی

III- Cardiogenic Shock

Here there is inadequate blood flow to vital organs due to inadequate cardiac output, despite a normal blood volume.

Causes:

- 1- Acute myocardial infarction (commonest cause).
- 2- Massive pulmonary embolism.
- 3- Cardiac tamponade.
- 4- Severe arrhythmia.
- 5- Improper treatment of hypovolemic shock may lead to cardiogenic shock.

Cardiogenic shock is characterized by congested neck veins and a high CVP.

Treatment:

- See treatment of infarction.
- Drugs to improve myocardial contractility (inotropics).
- Vasodilators to reduce after load increase cardiac output and decrease myocardial work.

IV- Neurogenic Shock

There is paralysis of the vasomotor fibers leading to peripheral pooling of blood and inadequate venous return. It may be due to:

1- Vasovagal attack:

It may follow hearing bad news, seeing an unpleasant event. Or severe painful stimuli. There will be extensive vasodilatation in the splanchnic area and excessive vagal stimulation of the heart that causes bradycardia.

2- High transection of the spinal cord or a complication of high spinal anesthesia.

In neurogenic shock there is hypotension. A normal pulse rate or bradycardia and warm dry skin.

Treatment:

- 1- The patient should lie flat with elevation of the legs.
- 2- I.V. crystalloid solution as Ringer's lactate.
- 3- Vasopressors may be prescribed.

V- Anaphylactic Shock

The patient develops bronchospasm, laryngeal edema and respiratory distress. Massive vasodilatation occurs and there is hypotension.

Treatment:

- 1- Intravenous hydrocortisone.
- 2- Antihistaminics.

VI- Endocrinal Shock

This may occur in patients with Addison's disease or those receiving continuous cortisone therapy if they are subjected to any stressful situation

Surgical infections

X Diagnosis of surgical infections:

- 1- Clinical examination.
- 2- Laboratory studies (e.g. leucocytosis).
- 3- Imaging studies.

أي infection من الجراحة
مثل زنى داء الكلب أو Breast abscess

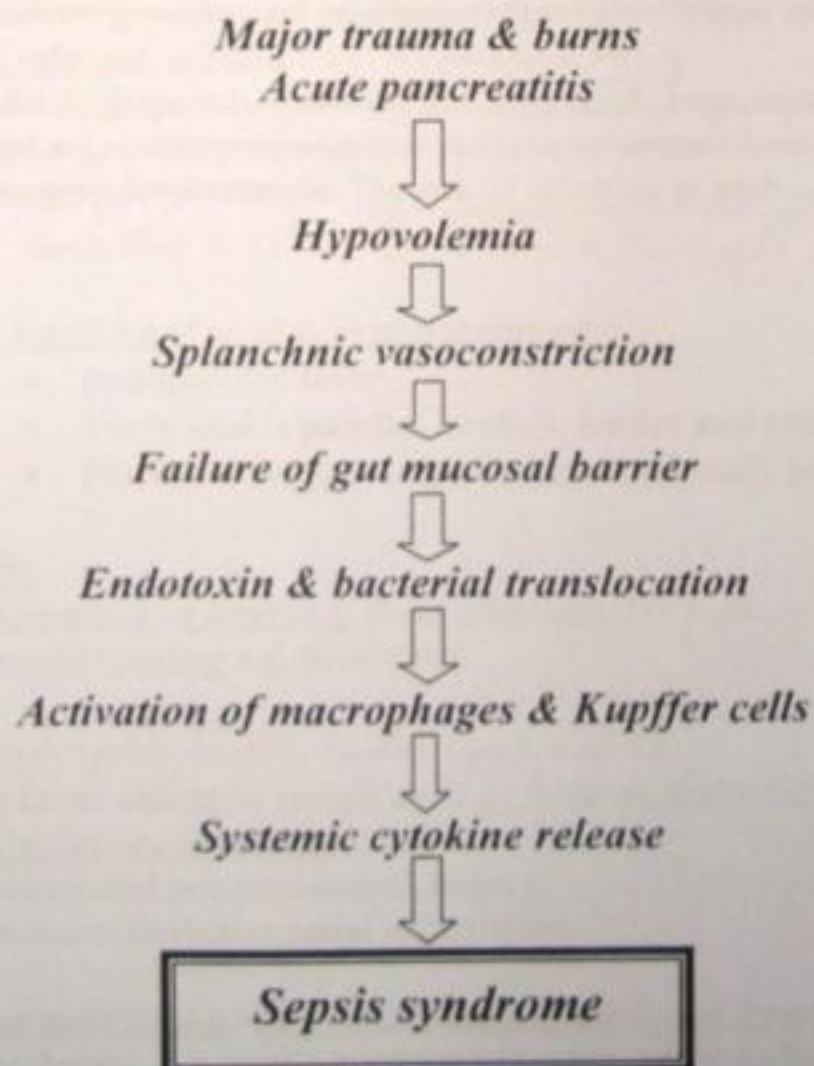
Principles of treatment:

- 1- Incision and drainage.
- 2- Excision.
- 3- Antibiotics.
- 4- General supportive measures.

Complications of surgical infections

هامة جدا نظري
مجتش قبل كذا

- 1- Spread of infections occur by several mechanisms:
 - a. Direct:
 - i. Necrotizing infections.
 - ii. Abscesses.
 - iii. Phlegmons: these contain little pus but much edema.
 - b. Lymphatic spread producing lymphangitis with the characteristic red streaks in the skin that travel proximally.
 - c. Blood stream produces pyemic abscesses, Bacteremia & septicemia.
- 2- Fistulae & sinus tracts: e.g. a neglected anal abscess ends in an anal fistula.
- 3- Necrosis or gangrene of the affected part.
- 4- Suppressed wound healing.
- 5- Immunosuppression & superinfection.
- 6- Systemic inflammatory response syndrome and multiple organ failure MOSF



Non-specific acute infections

Postoperative wound infection

صباح الراحه
تعطى الفارين

This is a serious problem that may complicate operative wounds, which may even cause mortality in severe cases.

Contaminating microbes may be derived from:

- 1) The patient himself (endogenous).
- 2) From his environment (surgical team, instruments, dressings...etc.)

Predisposing factors:

- General factors:
 - 1) Poor general condition.
 - 2) Systemic diseases that impair host defense as diabetes mellitus or uremia.
 - 3) Drugs that cause immunosuppression as corticosteroids or chemotherapy.
- Local factors:
 - 4) Poor blood supply.
 - 5) Poor surgical techniques e.g. rough handling of tissues. → رأيي AH أخطأ
 - 6) Presence of foreign bodies as prosthetic implants.
 - 7) Nature of the operation, e.g. operations for peritonitis.
 - 8) Defect in the sterilization technique in the operating theatre.

Types of surgical wounds:

- 1- Clean: There is no gross contamination from endogenous or exogenous sources such as herniorrhaphy and thyroidectomy wounds. The risk of infection is 1-2%. ex: Hernia operation
- 2- Clean contaminated: Wounds involve regions of the body that may contain low numbers of resident organisms e.g. urological or oropharyngeal procedures, or surgery on prepared colon. The risk of infection is 2-5%. ex: Appendectomy
- 3- Contaminated: An unprepared region of the body with large numbers of endogenous organism is entered e.g. surgery on unprepared colon or operation on grossly infected area of the body, e.g. surgery for peritonitis. The risk of infection in such cases is 5-30%. ex: peritonitis
وعود تفقد من الروضة بآحك تقول للبيان لا تفلح من

Clinical picture:

Usually appears between the fifth and tenth days postoperatively:

- Postoperative fever.
- The wound is **painful, swollen, tender and red.**
- **Fluctuant** areas or **crepitus** can occasionally be felt.

Differential diagnosis:

- 1- Other causes of postoperative fever, e.g. chest infections, DVT etc.
- 2- Other causes of wound swelling e.g. hematoma.

Prophylaxis:

تأليف بين اقلب. Preop. Factors

- c- Any predisposing factor should be controlled, e.g., diabetes, malnutrition, and anemia.
- d- Prophylactic antibiotics are indicated in:
 - a- Clean contaminated or contaminated surgery.
 - b- In wounds where foreign material is implanted.
- e- Before any elective colorectal surgery, preparation of the bowel is recommended.
- f- Proper surgical technique: e.g. gentle handling of tissues, adequate hemostasis.

Boil (Furuncle) ✕

- This is a staphylococcal infection of a hair follicle or a sebaceous gland.
- More common in diabetics and whenever there is lack of personal hygiene.
- Necrosis of the central part occurs and is discharged together with a small bead of pus.

Treatment:

- 1- Antibiotics effective against Staph. organisms, incision may be needed.
- 2- Icthiol ointment and warm foment.
- 3- Painting the surrounding skin with an antiseptic to prevent infection of the neighbouring glands or hair follicles.
- 4- Always suspect diabetes mellitus in patients who develop recurrent boils.

Carbuncle

كلمة جداً نظري

Definition:

Localized infective gangrene of the skin and subcutaneous tissues.

Pathology:

- 1- Route of infection: through hair follicles as a furuncle spreads to subcutaneous tissues and other hair follicles.
- 2- Predisposing factors: diabetes is the most important factor.
- 3- Sites: hairy areas with thick skin e.g. face, back of neck (nape), back of fingers & the back.
- 4- Naked eye appearance: Infection starts in the root of a hair follicle. This may lead to thrombosis of the blood vessels, leading to ischemia of the overlying skin resulting into infective gangrene of skin and subcutaneous tissues. Sloughing of the skin leads to multiple discharging openings on the surface.

N.B.: Infective gangrene may develop in the kidney leading to carbuncle of the kidney or cortical abscess.

Clinical picture:

It is more in males especially diabetics.

- Symptoms:
 - Patient complains of a furuncle that resists treatment & extends to other hair follicles.
 - Severe pain aching in nature (not throbbing).
 - Multiple discharging openings.
- Signs:
 - Skin is dusky in color.
 - Mild swelling with multiple sinuses discharging sloughs, usually no frank pus.
 - Marked diffuse tenderness.
 - Indurated swelling.

Complications:

- 1- Local spread of infection leads to cellulitis and lymphangitis.
- 2- Pyemia and septicemia.
- 3- Carbuncles of the dangerous area of the face can lead to cavernous sinus thrombosis.
- 4- Carbuncles of the back of the neck may rarely lead to epidural abscess or meningitis.

Treatment:

- 1- Antibiotics effective against resistant Staph. organisms.
- 2- Culture and sensitivity of the discharge.
- 3- Proper control of diabetes mellitus if present.
- 4- Glycerin magnesia & local foments help in the separation of the sloughs
- 5- Excision of sloughs.

Hydradenitis Suppurativa

خون! شمع! و...
 = خنک و سفت = غدد ملتهب

- Mixed Staph. and streptococcal infection of the apocrine sweat glands, in the perineum or the axilla, produces multiple abscesses and pus-discharging sinuses. Infection is difficult to eradicate and the case usually progresses to chronicity with considerable fibrous tissue reaction.
- In the perineum, hydradenitis suppurativa is often misdiagnosed as multiple anal fistulae. Careful examination reveals the absence of internal anal openings.
- **Treatment** by drainage of abscesses followed by careful hygiene, painting with disinfectants and antifungal applications may be enough. Otherwise, excision of the apocrine sweat-bearing skin followed by skin grafting is essential.

Necrotizing fasciitis

X

Etiology

- Invasive infection, caused by a mixed microbial flora including microaerophilic streptococci, staphylococci, Gram-negative bacteria and anaerobes, especially peptostreptococci, and bacteroids.
- The organisms gain access through a wound usually in immunocompromised patients.

Pathology

- The infectious process spreads along fascial planes & results in infectious thrombosis of vessels.
- Superficial skin necrosis. Hemorrhagic bullae appear as the first sign of skin death.
- Fascial and subcutaneous fat necrosis involves an area wider than the skin.

Clinical features

- The patient is alert and fully conscious with manifestations of toxemia.
- The skin shows hemorrhagic bullae and necrosis surrounded by edema and inflammation. Crepitus is occasionally present and the skin may be anesthetic.

Investigations

- Gram stained smears and cultures
- At surgery the finding of edematous, dull gray fascia and subcutaneous tissue with visible thrombi in penetrating vessels, confirms the diagnosis.

Prevention

Adequate debridement of wounds, blood loss replacement and antibiotics for contaminated wounds are essential to prevent postoperative necrotizing fasciitis.

Treatment

- Surgical treatment: Debridement, under anesthesia is essential.
- Antibiotics: Penicillin intravenously together with gentamycin or Amikacin.
- Blood transfusion, nutritional support and control of diabetes if present.

Prognosis

In many cases the diagnosis is missed. In elderly patients, the disease is likely to have a fatal outcome.

Acute Abscess

بنا الف، بروتاتكون

- It is a localized suppurative inflammation.
- The commonest causative organisms are staphylococci

Pathogenesis:

The organisms reach the tissues by:

- 1- Direct access through wounds.
- 2- Local extension from an adjacent focus
- 3- Lymphatic spread.
- 4- Blood spread.

Pathology:

An abscess consists of three zones:

- 1- A central zone of coagulative necrosis.
- 2- An intermediate zone of granulation tissue
- 3- A peripheral zone of acute inflammation

Fate:

- 1- Resolution if treated
- 2- Pointing and rupture (commonest sequel)
- 3- Spread of infection.
- 4- Chronicity.

Clinical Picture:

- Painful tender mass, skin is red & edematous.
- The draining lymph nodes are usually enlarged and tender.
- A systemic reaction in the form of fever, malaise, headache, tachycardia and anorexia.

When pus forms:

- 1- The pain becomes throbbing.
- 2- The fever becomes hectic.
- 3- The covering skin shows pitting edema
- 4- The inflammatory reaction becomes localized.
- 5- Fluctuation can usually be elicited in a subcutaneous abscess.
- 6- There is shooting leucocytosis with shift to the left

Treatment:

- 1- Before suppuration: antibiotic, rest, hot application and general supportive measures.
- 2- After suppuration: Once pus forms, the only treatment should be free drainage

Tetanus	Gas Gangrene فارسه احد انظر
Definition: X - Specific anaerobic infection - Mediated by neurotoxin - Lead to → Nervous irritability Tetanic muscular Contractions	Definitions - acute spreading gangrene - Associated w gas formation & profound toxemia by aerobic spore bearing Bacilli
Aetiology Organism : Clostridium tetani gram +ve Anaerobic Bacilli terminal Spore (drumstick appearance) Source of Organism - Organism naturally present in intestine of Horses - Spores present in manured soil & dirt - Spores resist heating, dryness, Boiling for 5 minutes Mode of Infection 1) Wound: contaminated by soil 2) Umbilical stump: infected catgut, contaminated dressing and powder. Toxins Neurotoxin Predisposing Factors 1) Wounds contaminated by hoarse excreta 2) Presence of FB or associated pyog. infection ميكروبي 3) Wound w low oxygen tension e.g deeply seated & lacerated wound 4) Wound low Blood supply عيان مفوضه e.g anemia, shock, اد جرح مفوضه Tight bandage Plaster of Paris	Aetiology Organism: fall into two groups 1- Saccharolytic Cl welchii ✓ cl. Septicum ميكروبي 2- Proteolytic cl. histolyticum ميكروبي cl. sporagars ميكروبي Source of Organism Organism: normal inhabitant intestine of man & animal Spores: manured land e.g Field battle- farms Mode of Infection 1- Wound: contamination of extensive wound in: - War injures - terrorist- attack on civilized person Toxins & Toxin : Others include: hyalouronidase, lipase <u>hemolysin</u> Predisposing Factor 1- lacerated wound involve Bulky ms e.g: gluteus 2- presence of FB or dead tissue 3- ischemia of muscle due to tight bandage, cast, suture undertension injury main vessel 4- infection w aerobic bacteria → make field suitable for clostridia(anaerobic) 5- Elderly person w above knee amputation & fecal incontinence.
Pathology - neurotoxin is an exotoxin produced locally & reach CNS via blood or motor nerves or both. Once reach CNS fixed by motor cells & then can't be detected in blood or CNS.	Pathology: either local or systemic Local: 1- saccharolytic org cause:- Necrosis of ms due to thrombosis of blood vessels and haemolysis of blood. Ferment glycogen of dead ms: liberation of H ₂ , Co ₂ Liberated B1 pigment stain ms Brick red colour.

Tetanus: pathology.

neurotoxin $\rightarrow$ blood causes severe harm.

if severe $\rightarrow$ toxic Myeloditis, hepatitis, ...

* Then it binds to nerves $\rightarrow$ ++ excitability of nerves

& has susceptibility to muscles of face

$\rightarrow$ spasm & lock jaw $\rightarrow$ bitter smile

* Then he enters in convulsions & between them periods of relief (tonic not completely relaxed).

in strychnine: periods of complete relax.

* he may die from Resp.

Gas Gangrene Pathology: 2 Groups Saccalytic & putrefactive $\rightarrow$ gangrene ^{داخلين}

Hs: سعال غير عادي Severe. تدخل putrefactive سعال

عن طريق انزيمات تعمل thrombosis in B.V. $\leftarrow$ وتعمل كسر $\leftarrow$ نضال CO.

يقوم بفتح سكتة و يزيل mouthless و بعد كذا gas release و هكذا.

* و ال heamolytic بيلون الحرج احمر $\leftarrow$ بر من بين يلقط !!

* بر تخلص و تقول لل putrefactive ادخل $\leftarrow$ تدخل من تحلل و تلون ازرق او اخضر و رائحة فضيحة.

* اما تدخل نادر $\leftarrow$ deadness $\leftarrow$ بين كاره تليها كذا $\leftarrow$ Amputation.

Mortality is 20%. , but Amputation is recommended.

* N.B.: Sometimes wound is contaminated with cl. welchii but no gas gangrene.

- antitoxin can neutralize neurotoxin just before it's localized in CNS.
- lead to excitability of medulla & spinal cord from which mild stimulus cause violent spasm
- Death from toxemia, exhaustion, resp. obst.

2- Proteolytic org. cause:
Ferment ptn. of dead ms $\rightarrow$ liberation of H_2S
 $+Fe \rightarrow Fe_2S_3 \rightarrow$ Greenish black discoloration

Systemic

- Blood hemolysis lead to $\rightarrow$ pallor, Tinge of jaundice
- Degenerative changes in liver, kidney, suprarenal

Clinical Picture

IP : non immunized pt 24h- 15 day
Inum - 11 day may weeks or months

divided into stages:

Toxemia : Δ temp. Δ pulse
Pt. Being irritable, headache, rigor
Pt- gets Hepatitis, myocarditis, gn

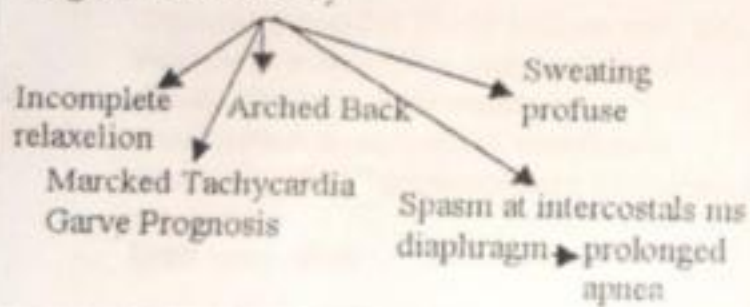
Tonic :

Pain, numbness, lock jaw, neck stiffness, bitter smile

Clonic :

- violent ms. Contraction reflex to minor stimulus e.g light

- stage characterized by



Clinical Picture

IP : varies from few hours to few days.

Divided : general, local

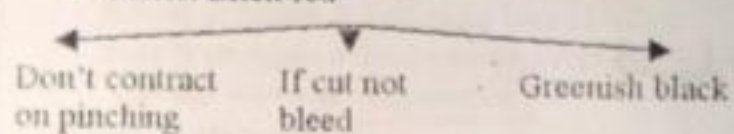
1) General Δ temp. Δ pulse
pt is apprehensive (irritable, nervous).
shock, oliguria

2) Local:-

gas: pain, numbness, wound is swollen, crepitus

Gangrene:

- serosanguineous discharge.
- muscle: Brick red



- overlying skin: greenish black
- offensive odour

Investigation

Polymorphnuclear leucocytosis is present

Investigation

Mainly, diagnosis based on clinical appearance at wound. *not just detection of cl.*

DD. tt msr

- 1) trismus: due to local cause e.g T.M.J arthritis
- 2) Tetany carpo-pedalspasm
- 3) Meningitis: neck muscle 1st.
- 4) Strychnine poisoning: complete relaxation
- 5) Rabies $\rightarrow$ history of a dog bite
spasm on seeing or drinking water
Mainly MS. Of Deglutition & resp.

DD: A } other cl. Infection

- 1) simple contamination not significant infection
- 2) gas abscess:
- noninvasive, no ms. involvement
- Wt : incision, drainage
- 3) cl. cellulitis
- SC, no ms involvement
- edema, gas, skin discoloration
- 4) Localized cl. myositis:
- non invasive
- myositis

5) oedematous gangrene :

- Highly fatal
- cl. oedematous
- No gas

B } Non cl infection

Mixture of gram -ve bacilli & gram +ve cocci

C } c- Surgical emphysema: presence of gas under skin

Complication

Due to toxemia

- myocarditis
- GN
- Hepatitis
- Avulsion fracture in bone

Clinical Subtypes

See notes

AH

Prevention Every child should be actively immunized by tetanus toxoid and continuing booster injection every 7-10 years <i>كل 7-10 سنوات من مودش احداثا</i> Individual on wound exposure <table border="0"><tr><td><i>Proper immunized</i> ↓ get booster dose 0.5ml IM</td><td><i>Improper immunized</i> <table border="0"><tr><td><i>Clean</i> ↓ • TT one dose</td><td><i>dirty</i> ↓ • TT • TIG • Ab</td></tr></table></td><td><i>Not previous immunized</i> <table border="0"><tr><td><i>Clean</i> ↓ • TT 3 doses 14.6 weeks interval</td><td><i>at risk</i> ↓ • TT • TIG 250U IM • Ab</td></tr></table></td></tr></table>	<i>Proper immunized</i> ↓ get booster dose 0.5ml IM	<i>Improper immunized</i> <table border="0"><tr><td><i>Clean</i> ↓ • TT one dose</td><td><i>dirty</i> ↓ • TT • TIG • Ab</td></tr></table>	<i>Clean</i> ↓ • TT one dose	<i>dirty</i> ↓ • TT • TIG • Ab	<i>Not previous immunized</i> <table border="0"><tr><td><i>Clean</i> ↓ • TT 3 doses 14.6 weeks interval</td><td><i>at risk</i> ↓ • TT • TIG 250U IM • Ab</td></tr></table>	<i>Clean</i> ↓ • TT 3 doses 14.6 weeks interval	<i>at risk</i> ↓ • TT • TIG 250U IM • Ab	Prevention All clostridia infection are preventable. - adequate debridement of wound, clean, left open - antibiotic penicillin - adequate care support avoid tissue hypoxia - Anti CG serum isn't used.
<i>Proper immunized</i> ↓ get booster dose 0.5ml IM	<i>Improper immunized</i> <table border="0"><tr><td><i>Clean</i> ↓ • TT one dose</td><td><i>dirty</i> ↓ • TT • TIG • Ab</td></tr></table>	<i>Clean</i> ↓ • TT one dose	<i>dirty</i> ↓ • TT • TIG • Ab	<i>Not previous immunized</i> <table border="0"><tr><td><i>Clean</i> ↓ • TT 3 doses 14.6 weeks interval</td><td><i>at risk</i> ↓ • TT • TIG 250U IM • Ab</td></tr></table>	<i>Clean</i> ↓ • TT 3 doses 14.6 weeks interval	<i>at risk</i> ↓ • TT • TIG 250U IM • Ab		
<i>Clean</i> ↓ • TT one dose	<i>dirty</i> ↓ • TT • TIG • Ab							
<i>Clean</i> ↓ • TT 3 doses 14.6 weeks interval	<i>at risk</i> ↓ • TT • TIG 250U IM • Ab							
Treatment: Intensive ttt should be started soon <i>درم الترتيب</i> 1- neutralize by antitoxin TIG 3,000- 6,000 unit IM give in proximal portion of wound or in vicinity of wound, repeated doses may be required. 2- Excise & debride: after neutralize of Toxin, wound left open & H ₂ O ₂ may needed 3- the pt. - Aqueous penicillin 20- 40 million unit/ day - Barbiturates should be cautiously used to avoid CRS failure (depression) <i>lowest</i> Curarization & mechanical ventilation - Don't disturb pt by unnecessary movement & excitement. - Dark quite room N.B: One attack of tetanus doesn't give life long immunity	Treatment 1) Wound Management (Under GA) - Dead Tissues & muscle are excised - Decompression of Tight fascial compartment - deep fascia, skin left open - daily exam & debridement is necessary - diverting colostomy in extensive perineal infections (<i>prophylaxis mainly</i>) - diffuse myositis & complete loss of blood supply or when a decquate debridement leave useless → amputation 2) Hyper baric oxygen ▼ bacteria invasion & toxin production given for 1-2 hrs, repeated every 6-12 hrs. 3) Fresh blood transfusion (early given) 4) Antibiotics: penicillin 20-40 million unit/day clindamycin metronedazole can be used Prognosis Mortality rate 20%							

Many thanks to Dr/ Aly Hassib

• Mohamed Farouk
'Rico'

• Abd El Rahman Youness



Before



After

نصحه!
متنهز ش

SYSTEM

Skin Coverage.

Graft or Flap.

بمنظرب

← حایة أخذتها من العیان ادتها للحیة
وبعد کذا أخذتها تاسر رکبتوها

→ حوت جزء مال رابها لاصا

العیان من غیر رابها Bl. Supply

* Split thickness:

* Full thickness: باخذ + ep + dermis. ولازم نقل ال
ولازم تأخذ من مكان مشر بیان ندر فی جرح

مزایا و عیوب:

Split: Regenerate, Reepithelialize.

کدام ال Graft یکن ~~اصغر~~ ارفع ناخذ رابها احسن
عنا کذا ال اناخذ باخذ احسن، بس کوننا و حسن، مش تستعمل
dermis.

* Composite graft: دا مش مع حایة.

غير موجود من كتاب النجم

• Treatment of special burns:1) Burns of the face: The aim:

- ✓ a- Is to keep the skin movable.
- ✓ b- To care for the eyes and ears
- ✓ c- Obtain good cosmetic result

X - Where the burn extends into the scalp, the hair is shaved for at least 2 inches beyond the burn. The burn is best treated by exposure but deep burns require early grafting either after initial excision or as soon as the eschar begins to separate.

X - In burns of the eyelids, the splinting action of the crust may lead to exposure keratitis, which should be avoided by the frequent application of Vaseline or cold cream. If the eye is injured, the conjunctival sac should be irrigated with normal saline and cocaine hydrochloride is instilled to alleviate the pain.

X - In burns of the ears, infection should be avoided to prevent exposure of the cartilage.

2) Burns of the hand: aim to achieve best functional results.

- The usual treatment is by occlusive dressing with the application of a plaster slab to ensure immobilization and facilitate elevation.
- The dressing is left for 12 - 15 days by which time superficial burns are healed but deep burns will require grafting after a further 10 days of preparation.

3) Burns of joint surfaces: aim as hand, splinting & physiotherapy are essential.

- X - Exposure treatment with hydrotherapy and physiotherapy is the best method.
- X - In deep burns, early skin grafting is essential to obtain a good functional result and avoid contractures and deformities.

4) Burns of the perineum: special attention must be taken towards:
1- urinary meatus (to avoid obstruction). 2- avoidance of fusion of labia.

- X - The best treatment is by exposure and topical silver sulfadiazine applications.
- X - In burns of the penis, the external meatus should be attended to, in order to prevent stricture, and in burns of the vulva a pledget of gauze or cotton wool should be inserted between the labia to prevent adhesions.

Principles of skin coverage

هام جداً شغري
ومحتول نظري.

Skin defects represent one of the common problems in surgical practice.

Etiology:

X Trauma, burns or following the surgical resection of different benign and malignant lesions.

1- Skin grafts:

There are two Types of skin grafts:

- 1- The split thickness (Thiersch) graft: Includes the epidermis and part of the dermis.
- 2- The full thickness (Wolfe) graft: Includes the epidermis & the full thickness of the dermis.

	<i>Split thickness (Thiersch) graft</i>	<i>Full thickness (Wolfe) graft</i>
<i>Advantages</i>	• Good take. • Donor site heals spontaneously.	• Minimal contraction • Resistant to trauma. <i>skin palm of hand</i> • Better sensation. • Aesthetically better. <i>نظائر الوجه</i>
<i>Disadvantages</i>	• Maximum contraction. <i>So do plastic</i> • Weak resistance to trauma. • Poor sensation. • Aesthetically poor. <i>نظائر الوجه</i>	• Less take. • Donor site must be closed surgically. • Donor sites are limited.
<i>Sites</i>	• Hidden areas e.g. thigh.	• Above the clavicle. • Behind the auricle.

- **Composite graft:** Is skin graft, which includes an underlying tissue, e.g. subcutaneous tissue, muscle, cartilage, or bone.

Graft survival

- The vascular status of the bed determines the survival (take) of a skin graft.
- Bare conical bone (devoid of periosteum), bare tendon, and bare cartilage will not take a skin graft. **Take depends upon:**
 - 1- The status of the recipient bed. ★
 - 2- The graft thickness (*the thinner the graft, the faster is the take*).
 - 3- The size of the graft (*a small graft takes rapidly*).

II- Flaps:

Definition:

Tissues transferred from one site of the body to another with their blood supply.

1- Skin flaps:

- These can be classified:

a) Local flaps.

b) Distant flaps.

Cross leg flap, Abd. wall to hand.

- According to vascular pattern flaps are classified into:

- **Random pattern flaps** with no anatomically recognized blood supply. They have a strict length to width ratio of 2:1 & maximally not exceeding 3:1.

- **Axial pattern flaps** supplied by a known artery. ~~They may retain their skin attachment to the donor area & are termed pedicled flaps, if not, they are termed island flaps.~~

- 2- Musculocutaneous (myocutaneous) flaps: these are axial flaps that receive their blood supply from the underlying muscles through perforator vessels. A famous example is the latissimus dorsi myocutaneous flap & the pectoralis major myocutaneous flap.
- 3- Fasciocutaneous flaps: they have the same principles as the previous one, but their blood supply is through fasciocutaneous perforators.
- 4- Microvascular free flaps

III- Tissue expanders: X

معلومات عامة

Tissue expanders are inflatable silicon implants. They are placed subcutaneously in collapsed state. Over several weeks the expanders is gradually inflated with saline through a subcutaneous port. The overlying skin is gradually stretched to accommodate a larger area. Finally, the expanded skin can be used to cover defects & the tissue expander is removed.

يخطط بالون تحت الجلد وتنفخها في الجلد بأكبر وتقدر تستخدم في تغطية العيوب

Aesthetic surgery X

عمليات تجميل

Definition:

This is surgery intended to improve the appearance.

Examples:

- Rhinoplasty.
- Face lifting.
- Eyelids surgery.
- Breast surgery e.g. augmentation mammoplasty and reduction mammoplasty.
- Liposuction.

Surgical nutrition

هام جداً نظري

Enteral nutrition**Indications:**

Indicated in patients in whom oral intake is inadequate or impossible, while having a functional accessible gastrointestinal tract as in unconscious patients, severe dysphagia & head & neck surgery.

Route of administration:

Through a nasogastric tube, or through a surgical or percutaneous intubation of the upper gastrointestinal tract e.g. gastrostomy or a jejunostomy.

Administration regimens and formulae:

For stomach, liquid diets formed of soups, juice, milk, and blenderized food is generally well tolerated if administered at a reasonable rate. The jejunum, on the other hand, is highly sensitive, and feeding should be started with isotonic, sterile formulae at a slow rate.

Complications:**1- Mechanical complications:**

Pharyngeal and oesophageal mucosal irritation and ulceration, obstruction of the feeding tube lumen, and tube displacement.

2- Gastrointestinal complications:

Nausea, vomiting and pulmonary aspiration, distention.

3- Metabolic complications:

e.g. glucose intolerance & electrolyte imbalance.

Parental nutrition

Indications:

- For the malnourished or the hypercatabolic patient with failure of nutrients absorption e.g. massive bowel resection, severe inflammatory bowel disease.
- Preoperative to the severely debilitated patient 10-14 days prior to operation reduces postoperative mortality.

Route of administration:

Central venous catheter inserted percutaneously through either the subclavian, or the internal jugular vein, and threaded forward so that its tip will lie in the superior vena cava.

Administration regimens and formulae:

The daily requirements are estimated according to the body weight & to which are added the deficits.

- Carbohydrates are provided by 20% or 50% glucose.
- Proteins are administered as L-amino acids solutions that should contain the essential members.
- Fat emulsions are produced from soya oil (Intralipid) & are available in 10% & 20% concentrations

Monitoring:

- 1) Measuring the body weight is done daily.
- 2) Daily balance of fluid intake and output.
- 3) Estimation of plasma proteins, serum calcium, magnesium and phosphate, liver function tests, and blood coagulation studies.
- 4) Manifestations of sepsis are always searched for.

Complications:

- 1) Nutritional and metabolic complications e.g. hyponatremia, hypokalemia, or hyperglycemia.
- 2) Catheter Complications:
 - a- Misplacement of the catheter.
 - b- Insertion of the catheter tip into the pleural cavity, hemothorax or pneumothorax.
 - c- Air can be sucked into the superior vena cava.
 - d- Venous thrombosis.
 - e- A common serious complication is the central venous catheter infection, and septic thrombophlebitis which lead to septicemia and, if neglected, death.

Malnutrition in surgical patients

هام جداً نظري

Causes:

The two principal causes of malnutrition in surgical wards are starvation and the catabolism of surgery and trauma and their complications.

Starvation

1. Social causes as poverty, and the neglected elderly.
2. Dysphagia, e.g. carcinoma of the esophagus.
3. Loss of appetite by visceral malignancy e.g. carcinoma of the stomach.

ما خسرنا الا كل امل
رجوعه
Malabsorption

4. Repeated vomiting, e.g. pyloric stenosis.
5. Malabsorption e.g. extensive inflammatory bowel disease.
6. Extended postoperative restriction of oral intake.

Hypercatabolism

1. Major trauma and burns.
2. Major surgical procedures.
3. Severe acute pancreatitis & major sepsis, e.g., peritonitis and septicemia.

Effects of malnutrition on the outcome of surgery

1. Impairment of wound healing.
2. Suppression of immune response and a higher susceptibility to infection.
3. ~~A sense of mental and physical exhaustion that delays recovery.~~
4. Reduced tolerance to radiotherapy and anticancer chemotherapy.

Diagnosis

There is a very wide range of tests, some of which are highly sophisticated, for the assessment of the degree of nutritional impairment. Some of the simpler indications of malnutrition are mentioned below.

Anthropometric measures e.g. body weight less than 80% of the ideal for height

Laboratory tests

1. Serum albumin.
2. Daily nitrogen balance.

Immune functions: Total lymphocyte count below $1.2 \times 10^9/L$

Transplantation

هام جداً نظري

Organ donation

Donor types:

معلومات عامة

- 1- **Living donor:** paired organs e.g. kidney & vascularized segmental pancreatic & liver transplantation.
- 2- **Cadaver donors:** this method avoids the risk of complications, which may occur to the living donors and has the advantage that multiple organs can be taken from one cadaver and transplanted to many patients with brain stem death. The criteria of brain stem death are:
 1. Deep coma (no response to external stimuli).
 2. Bilateral dilated fixed pupils.
 3. Absence of all reflexes (gag, corneal, etc).
 4. Inability to maintain the vital signs for three minutes without artificial means → not legal in Egypt.
 5. Flat EEG in all channels (i.e. absence cortical activity).

Organ Preservation

معلومات عامة

1. Cooling (surface or perfusion) down to $0-4^{\circ}C$ to reduce tissues metabolism.
2. Perfusion of a special fluid medium to prevent cellular edema & maintain vitality.

Renal Transplantation	Hepatic Transplantation	Pancreatic Transplantation
Indications		
All cases of end-stage renal disease which may be secondary to: 1) Glomerulonephritis (most common cause). 2) Hypertension. 3) Diabetes. 4) Chronic Pyelonephritis. 5) Polycystic disease. 6) Lupus nephritis. 7) Obstructive uropathy. 8) Congenital nephrotic syndrome. If a related living donor is available and willing, then early transplantation is indicated even before the start of hemodialysis. If the living related donor is not available, the patient is immediately placed on a cadaver donor list (not legalized in Egypt).	1) <i>In children:</i> مشترك بين كل الأنساب • Cirrhosis due to biliary atresia, congenital hepatic fibrosis, and congenital hepatic cirrhosis. • Metabolic disorders as glycogen storage disease, alpha 1 antitrypsin deficiency, galactosemia and histocytosis. 2) <i>In adults:</i> • Cirrhosis: Primary and secondary biliary cirrhosis, chronic active hepatitis, sclerosing cholangitis and alcoholic cirrhosis (relative indication). • Metabolic: ex <i>يولي</i>. Hemochromatosis, Wilson's disease and Budd-Chiari syndrome. • Neoplastic The tumor should be localized and there should be no evidence of metastases.	1) Type 1 insulin dependent diabetes mellitus with renal failure. Combined renal and pancreatic transplantation is performed. 2) Patients with previous renal transplantation suffering from severe diabetes. لو كذا ال مريض ← واحدة
Technical consideration		
• The grafted kidney is placed in an extraperitoneal position in the iliac fossa (preferably the right one). • The arterial anastomosis is performed between the renal artery and the external iliac or internal iliac artery. • The venous anastomosis is performed between the renal vein and the external iliac vein. • The ureter of the grafted kidney is anastomosed to the patient's urinary bladder	Orthotopic Liver Transplantation: من نفس المكان The liver of the recipient is removed. The new cadaveric liver graft is placed in the same position of the original liver and the following anastomoses are performed in order: Suprahepatic IVC. Infrahepatic IVC. Portal vein of recipient to donor. Hepatic artery of recipient to donor. Common bile duct of recipient to donor. Nowadays, segmental liver transplantation from living donors are being successfully performed	There are two types of pancreatic transplantation: 1) Vascularized pancreatic transplantation: Whole or segmental pancreatic transplantation is performed. 3) Islets of Langerhans implantation (still under study).

General principles of ttt of tumors.

- 1- prophylactic ex: Familial polyposis → total Clectomy.
2. ttt of established cases → إلى A.H. مده ~~في~~ قبل 15
operable, inoperable, —.
- 3- ttt Modalities include:
 - a - Surgery +
بعض الشرح
radical + palliative.
+ ex:
Cancer Colon or Caecum, Hccted.
 - b - Radiotherapy: ex: lip, tongue, Sq. Cell Carcinoma.
 - c - Chemotherapy: Lymphoma.
 - d - Hormonal ttt: Breast & prostate.
 - e - Immunotherapy: eg: BCG in bladder Carcinoma.
 - f - Bone Marrow transplantation.

It is more blessed to give than to receive.

- 1. Superficial burns are caused by burning agents
- 2. Specific treatment

Introduction of Burns

Burns

Wound
Injury
Trauma

Wound injury

- There is one of the most serious injuries to the body
- There causes dramatic damage to the physiological functions of the skin, which lead to serious local or systemic complications
- By area and weight, the skin is the second largest organ in the body next only to the muscles
- Loss of large amounts of skin, if not replaced, is incompatible with life

Area 2.3 m²
Weight 15 kg

Etiology:

- **Thermal:** Caused by heated liquids
- **Flame burns:** Often due to ignition of clothing
- **Electric burns:** Direct & indirect are great consequences, that every organ in the body may be affected
- **Chemical burns:** Not due to direct touch or inhalation
- **Toxicologic burns:** Due to exposure to hot gases and smoke

Classification:

Burns are classified according to the degree with involved according to the depth of the burned tissues

1- Classification according to the percentage of surface area involved.

This follows the rule of 9.

It is evident the rule of 9 mostly serves classification due to the large size of the head in comparison to the rest of the body.

Burns are classified into:

1. A **major burn** involves more than 30% of the body surface area
2. An **intermediate burn** involves 15-30% in adults and between 10-30% in children
3. A **minor burn** is less than 15% in adults and 10% in children



Rule of 9

2- Classification according to the depth:

- 1- **First degree burns:** The most superficial is superficial (here the epidermis is damaged causing redness of the skin. They heal rapidly)
- 2- **Second degree burns:** The epidermis & a portion of the dermis are damaged

If no bacterial invasion, epithelial regeneration can occur from the remnants of hair follicles and sweat glands in the dermis and the burn will heal in 3 weeks. If extensive second degree epithelial destruction was destroyed and the cells will be changed to a full thickness burn.

This degree is further subdivided into

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درویشی و فقر

و فقر و غنا و ...
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درویشی و فقر

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It is more pleasant to give than to receive.

K. Total partial thickness burns

- The epidermis and a portion of the dermis are damaged

L. Full thickness burn:

- There is complete destruction of the epidermis and dermis
- After separation of the eschar by the third week, the patient should be prepared for skin grafting

The differentiation of partial thickness from full thickness burn is sometimes difficult and even in the same area both patterns may occur together. However, the following may help in differentiation

Partial thickness burns	Full thickness burns
1) Appear red	1) White or black eschar
2) Respond to resolution of edema	2) Dry
3) Grow blisters surrounded by erythema	3) No blisters, capillary thrombosis, ulceration, necrosis
4) Very painful and sensitive to an light touch test	4) Painless due to loss of the sensory nerve endings
5) Should heal within 3 weeks	5) Involvement more extensive and eschar separation begins after 3 weeks

Question: If a burn is superficial, the hair will grow back. If the hair falls out permanently, the burn is a deep burn.

Histopathology:

- Temperature greater than 42°C leads to protein denaturation, which prevents the capacity of cellular repair.
- Thermal injury to the skin results in 3 distinct zones:
 - The central zone zone of coagulation:** If full, the eschar separates within 3 weeks leaving either a bed of granulation tissue or full thickness burn or a deep partial thickness burn.
 - The intermediate zone zone of stasis:** Near the zone of the next 48 hours post burn, if tissue regeneration is not accelerated.
 - The outer zone zone of desquamation:** Tissue in this zone normally sloughs within 1-2 days unless subjected to infection.

The rate of healing of burn depends on the depth of a burn and whether the wound is infected.

Pathophysiology:

- Increased capillary permeability leads to the loss of numerous amounts of fluids & proteins in the damaged area. It is maximum in the first 2 hours and continues for 48 hours.
- Excessive loss of water by evaporation with loss of calories, the result will be severe dehydration & malnutrition.
- The burn area will be colonized by bacteria.
- Increased metabolic rate and nutritional demand.

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Complications of Burns

1. Systemic complications



Respiratory issues

- Respiratory issues arise immediately from inhalation of heat or gases
- Respiratory distress, inflammation, and pneumonia may follow
- Usually respiratory failure may occur with severe injury

XXX
•
G
E

Cardiac shock

- Cardiac shock is caused by pain
- Cardiac shock may develop if the fluid losses are not properly corrected

Renal failure

- Renal failure occurs most often not soon after prolonged uncorrected hypotension

Acute renal tubular necrosis

- Acute elevation of urea and creatinine (Cockcroft's) are early signs associated with the renal pathology, one of renal failure
- Renal failure occurs during the early post burn period
- Acute elevation of the urea probably due to renal injury
- Multiple organ failure often follows severe burns. The outcome is poor

2. Local complications

a. Early local complications

- Infection is the primary cause of death in burn patients. Infection may lead to the development of sepsis and multi-organ failure. It occurs usually between 4 - 7 days post burn. Treatment is usually by penicillin through parenteral route. Local infection can lead to systemic infection. Severe burns may lead to sepsis and multi-organ failure.
- Wound complications include the burns and local infection which may lead to sepsis and multi-organ failure. Severe burns may lead to sepsis and multi-organ failure.
- In some of the burns and local infection may lead to sepsis and multi-organ failure. Severe burns may lead to sepsis and multi-organ failure.
- Complications include the burns and local infection which may lead to sepsis and multi-organ failure. Severe burns may lead to sepsis and multi-organ failure.

b. Delayed local complications

- Contracture complications include the burns and local infection which may lead to sepsis and multi-organ failure. Severe burns may lead to sepsis and multi-organ failure.
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- Contracture complications include the burns and local infection which may lead to sepsis and multi-organ failure. Severe burns may lead to sepsis and multi-organ failure.

Management of burns

A- First aid management

1. A proper assessment should be done
2. A strong analgesic or other analgesic is administered if needed

3. Remove prophylactic
4. Apply sterile gauze or other material over the burn area for 15 minutes to prevent infection and reduce the pain

B- Minor Burns: (Less than 30% in adults and 10% in children)

Can be treated at home with first aid treatment

- Showering using low pressure water is recommended
- Analgesic and antibiotic prophylaxis

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• Treatment of animal burns

1) Burns of the face: The aim

a) Is to keep the skin healthy

b) To cover the eye and ear

c) To ensure good cosmetic result

When the face is affected care be taken the hair is shaved for at least 2 inches beyond the burn. The hair is best treated by epilation. The deep burns require early grafting either after initial debridement or as soon as the surface begins to separate.

In burns of the eyelids, the eyelid margin of the eye may need to separate formation, which should be avoided by the frequent application of Vaseline or castor oil. If the eye is injured the conjunctival sac should be irrigated with normal saline and covered by hydrocortisone. It is essential to relieve the pain.

In burns of the ears, infection should be avoided by prompt exposure of the cartilage.

2) Burns of the head

The initial treatment is by debridement followed by the application of a plaster cast to ensure immobilisation and to reduce oedema.

The dressing is left for 12-15 days by which time superficial burns are healed but deep burns will require grafting after a further 10 days of preparation.

3) Burns of joint surfaces

Episodic treatment with hydrotherapy and physiotherapy is the best method.

In deep burns, early skin grafting is essential to obtain a good functional result and avoid contractures and deformities.

4) Burns of the perineum

The best treatment is by exposure and topical silver sulfadiazine application.

In burns of the penis, the external meatus should be protected by, in order to prevent stricture, and in burns of the scrotum a phallus of gauze or cotton wool should be inserted between the labia to prevent adhesion.

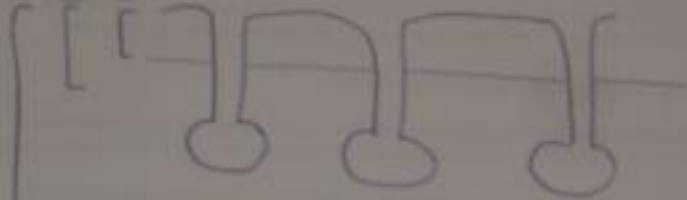
- Some of the above will be done by the vet.

1) Debridement, 2) Dressing, 3) The burn of the face

It is more blessed to give than to receive.

According to depths

① ② ③
 ④ ⑤ ⑥
 ⑦ ⑧ ⑨
 ⑩ ⑪ ⑫



Partial
 thickness
 (not depth)

- ① re-epithelialization
 - ② " " " "
 - ③ " " " "
- ④ 3 weeks (epithelialization)
- ⑤ ()

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Freely you have received; freely give.

ARTT

2. Assessment
Assess: Assess the patient's condition
Assess: Assess the patient's condition
Assess: Assess the patient's condition
Assess: Assess the patient's condition
Assess: Assess the patient's condition
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Management of Burns

3. Management
3.1. Airway
3.2. Breathing
3.3. Circulation
3.4. Disability
3.5. Exposure
3.6. Fluids
3.7. Pain
3.8. Wound care
3.9. Infection
3.10. Psychological
3.11. Transfer
3.12. Documentation

Management of Burns

4. Assessment
4.1. Airway
4.2. Breathing
4.3. Circulation
4.4. Disability
4.5. Exposure
4.6. Fluids
4.7. Pain
4.8. Wound care
4.9. Infection
4.10. Psychological
4.11. Transfer
4.12. Documentation

Management of Burns

1. Airway
1.1. Assess for airway compromise
1.2. Assess for facial burns
1.3. Assess for inhalation injury
1.4. Assess for carbon monoxide poisoning
1.5. Assess for cyanide poisoning
1.6. Assess for hypoxia
1.7. Assess for hypercapnia
1.8. Assess for respiratory distress
1.9. Assess for stridor
1.10. Assess for hoarseness
1.11. Assess for cough
1.12. Assess for sputum
1.13. Assess for wheezing
1.14. Assess for crackles
1.15. Assess for decreased breath sounds
1.16. Assess for tachypnea
1.17. Assess for tachycardia
1.18. Assess for hypotension
1.19. Assess for hyperthermia
1.20. Assess for hypothermia
1.21. Assess for acidosis
1.22. Assess for alkalosis
1.23. Assess for electrolyte imbalance
1.24. Assess for renal impairment
1.25. Assess for liver impairment
1.26. Assess for neurological impairment
1.27. Assess for psychological impairment
1.28. Assess for social impairment
1.29. Assess for legal impairment
1.30. Assess for ethical impairment
1.31. Assess for environmental impairment
1.32. Assess for cultural impairment
1.33. Assess for religious impairment
1.34. Assess for spiritual impairment
1.35. Assess for intellectual impairment
1.36. Assess for emotional impairment
1.37. Assess for behavioral impairment
1.38. Assess for cognitive impairment
1.39. Assess for perceptual impairment
1.40. Assess for motor impairment
1.41. Assess for sensory impairment
1.42. Assess for communication impairment
1.43. Assess for mobility impairment
1.44. Assess for self-care impairment
1.45. Assess for knowledge impairment
1.46. Assess for values impairment
1.47. Assess for beliefs impairment
1.48. Assess for attitudes impairment
1.49. Assess for interests impairment
1.50. Assess for strengths impairment
1.51. Assess for weaknesses impairment
1.52. Assess for needs impairment
1.53. Assess for resources impairment
1.54. Assess for support impairment
1.55. Assess for coping impairment
1.56. Assess for problem-solving impairment
1.57. Assess for decision-making impairment
1.58. Assess for goal-setting impairment
1.59. Assess for time-management impairment
1.60. Assess for stress-management impairment
1.61. Assess for anger-management impairment
1.62. Assess for anxiety-management impairment
1.63. Assess for depression-management impairment
1.64. Assess for bipolar-management impairment
1.65. Assess for schizophrenia-management impairment
1.66. Assess for personality-management impairment
1.67. Assess for eating-disorder-management impairment
1.68. Assess for substance-use-management impairment
1.69. Assess for self-harm-management impairment
1.70. Assess for suicidal-management impairment
1.71. Assess for homicidal-management impairment
1.72. Assess for paraphilic-management impairment
1.73. Assess for transsexual-management impairment
1.74. Assess for gender-management impairment
1.75. Assess for sexual-management impairment
1.76. Assess for reproductive-management impairment
1.77. Assess for endocrine-management impairment
1.78. Assess for immune-management impairment
1.79. Assess for nervous-management impairment
1.80. Assess for muscular-management impairment
1.81. Assess for skeletal-management impairment
1.82. Assess for integumentary-management impairment
1.83. Assess for digestive-management impairment
1.84. Assess for urinary-management impairment
1.85. Assess for circulatory-management impairment
1.86. Assess for respiratory-management impairment
1.87. Assess for reproductive-management impairment
1.88. Assess for excretory-management impairment
1.89. Assess for sensory-management impairment
1.90. Assess for motor-management impairment
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1.97. Assess for values-management impairment
1.98. Assess for beliefs-management impairment
1.99. Assess for attitudes-management impairment
1.100. Assess for interests-management impairment

Management of Burns

2. Breathing
2.1. Assess for respiratory distress
2.2. Assess for tachypnea
2.3. Assess for tachycardia
2.4. Assess for hypotension
2.5. Assess for hyperthermia
2.6. Assess for hypothermia
2.7. Assess for acidosis
2.8. Assess for alkalosis
2.9. Assess for electrolyte imbalance
2.10. Assess for renal impairment
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2.47. Assess for depression-management impairment
2.48. Assess for bipolar-management impairment
2.49. Assess for schizophrenia-management impairment
2.50. Assess for personality-management impairment

Management of Burns

3. Circulation
3.1. Assess for hypotension
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ARTT: Assessment, Resuscitation, Treatment, Transfer

White Knight Love